ARCHITECTURAL CONCRETE

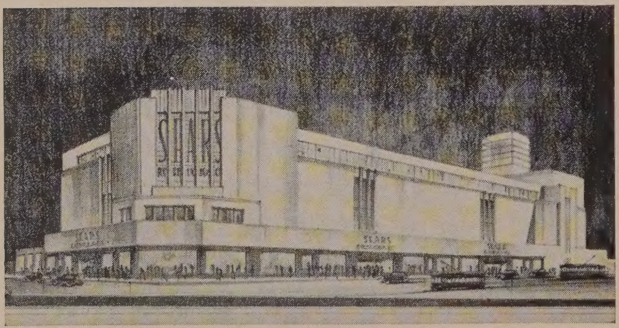
VOLUME FOUR NUMBER TWO

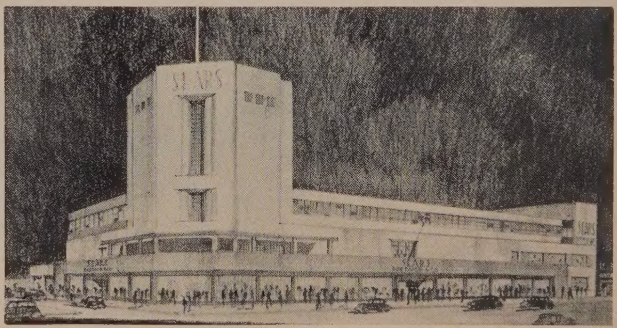
New Stores for
SEARS, ROEBUCK & CO.

Highland Park, Mich. and Glendale, Calif.
Nimmons, Carr & Wright, Architects

TWO of four new stores for Sears, Roebuck & Company are at Highland Park, Michigan (see cover), and at Glendale, California (above). While they are similar in layout and in simple use of formed concrete, they differ somewhat in detail. The Highland Park building was constructed by Patterson Engineering Co. of Detroit. Ford J. Twaits Co., Los Angeles, was contractor for the Glendale structure.

Comparison of the two occupied buildings with renderings of the Highland Park and Glendale projects reveals that neither is finished, but requires an additional story. See Architectural Concrete, Vol. 4, No. 1, *for renderings of Chicago and Baltimore stores.*





Architectural
CONCRETE

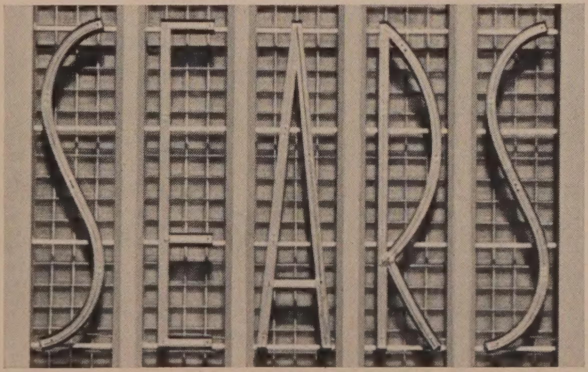
Four Stores for Sears

Demonstrate Trend in Commercial Building Design

By George Wallace Carr, A.I.A.

Of the four large new structures designed as retail outlets for Sears, Roebuck & Company, two—at Glendale, California, and Highland Park, Michigan—are already occupied; the third at Baltimore is progressing rapidly; and the last, at Chicago, is just getting its first-floor slab placed as this is written. Obviously, one reason for a discussion of these buildings here is the fact that each of them is designed and executed in concrete. A more valuable reason may be that these structures, both in design and construction, reflect a trend in commercial and industrial building.

Economy is a first requirement in commercial building construction and, without doubt, reinforced concrete has come to be the material that best satisfies this requirement. This is interesting to note: for while economy is not the only virtue of concrete, the need for a low cost construction material has been largely instrumental in developing it for the wide acceptance it enjoys today as an architectural medium.

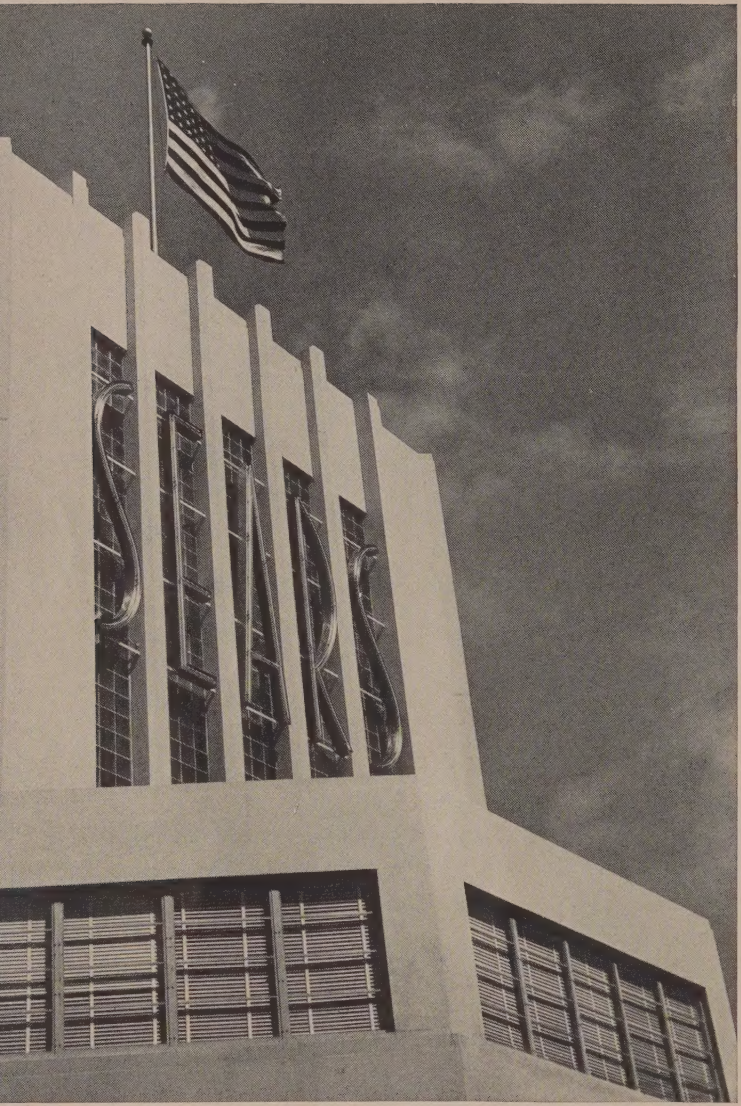


Glass brick forms background for huge sign.

We have been interested in concrete as a building material for some time. We watched it in its early awkward stages, followed its evolution to success on the West Coast, and have been more than concerned with its progress eastward during the past few years. Our change to concrete, therefore, was not as abrupt as it may seem. Many things are considered and weighed before determining to follow a new course or new practices; it is only putting them into effect that appears to be a radical departure.

Architects are always under pressure, both in their minds and in their consciences, to produce something that has new merit. This is responsible for whatever originality there is in architecture, and it is the force that impels architects into new paths of endeavor and sets them to work at new combinations of materials. But uppermost in architects' thoughts these days is the constantly reiterated question: "How can we produce beautiful, appropriate structures, yet save our client time and money?" Here concrete offers fresh possibilities.

There are many splendid building materials and any of them, properly handled, can produce effective and appropriate structures. But, if time and money are vital elements, not all of these materials can be considered. When a structural frame building with filler walls gets its top slab in place, the job is less than half done; for then it is necessary to go back to the ground and start up again, filling in the walls and finishing the interior. With an all-concrete building valuable time is saved in enclosing the structure. When the second-floor slab is cast the walls of the first story are in place, and the work of installing finish and mechanical trades can start as soon as shores are re-



Essentially a windowless structure, glazing is used over the entrance of the Highland Park store and at the ends of main aisles.

moved. When the top slab is in place, all the walls are up and the levels below will be well advanced toward completion inside. The time saved is money saved—and these are prime requirements.

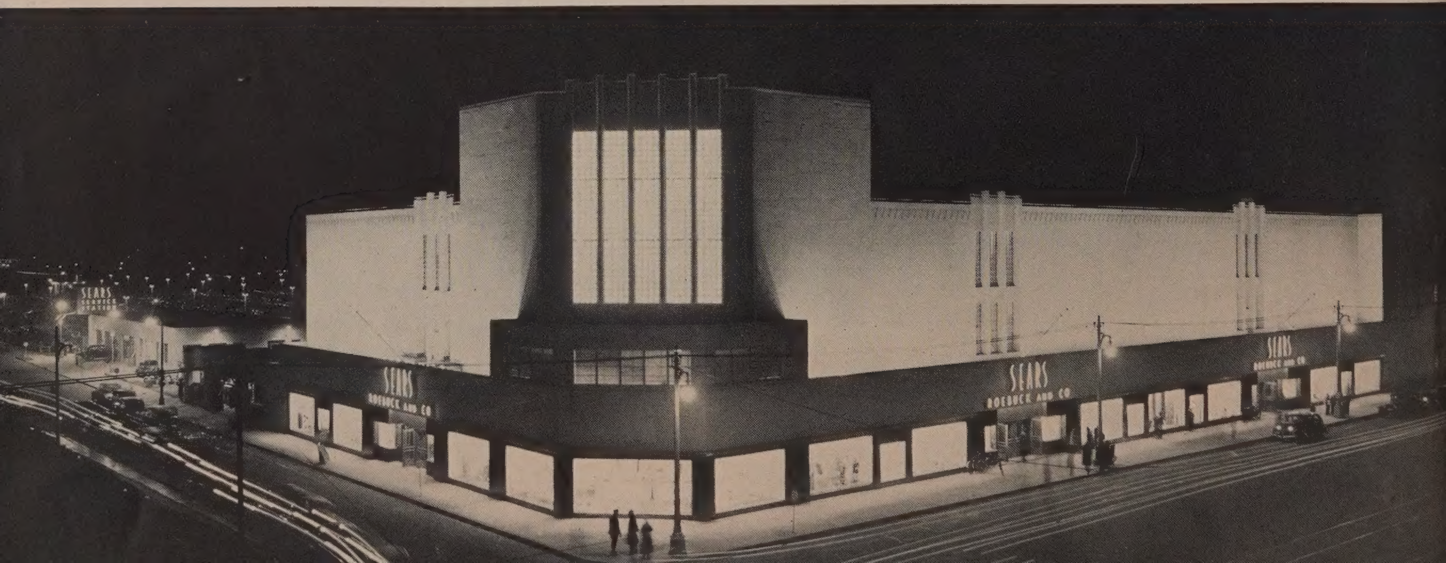
Concrete technique has advanced rapidly. Fine architecture has been produced in the material and concrete has improved year by year. We were confident of concrete before we engaged in this current program—and the results have backed up our belief.

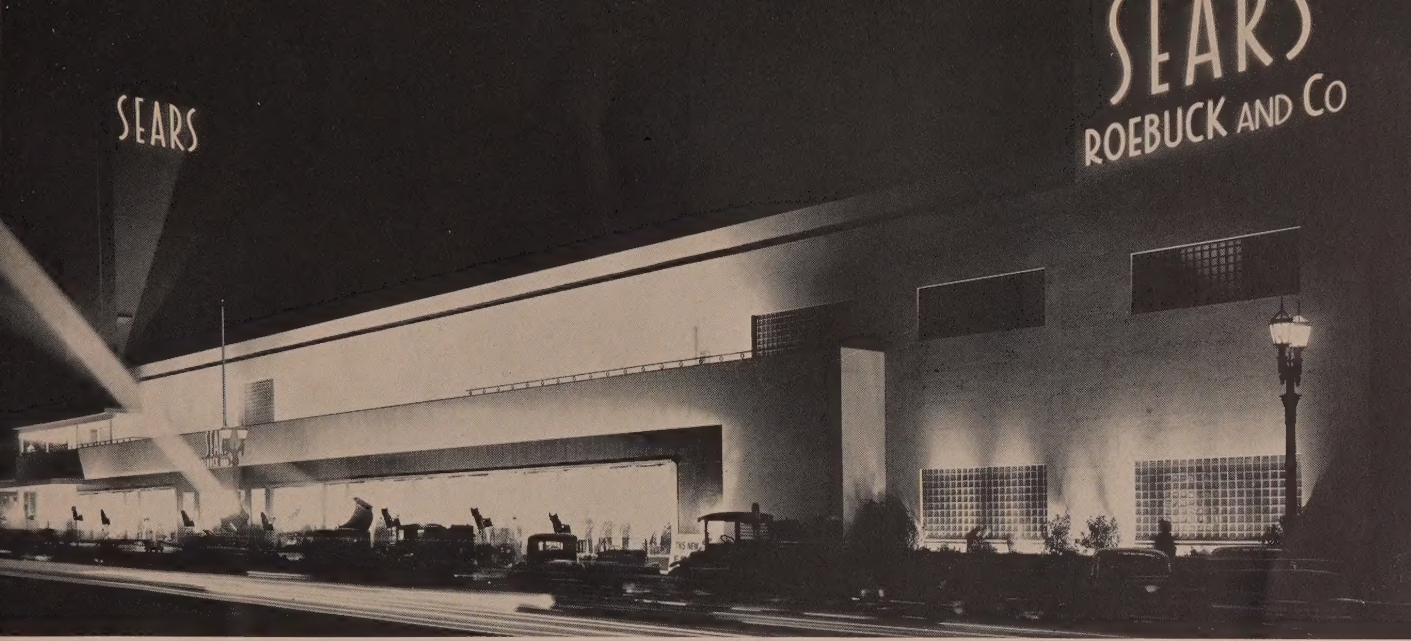
Although this article should primarily concern the two occupied Sears buildings, any discussion of their design and construction would be incomplete without considering all four. It has been observed that each of them, although they differ widely in plan and general use of detail, resembles the others sufficiently to confess a family identity. Their common source of inspiration had something to do with this, but we think that it is due mainly to a faithful carrying-out of an ideal—to express the function of the buildings as simply as possible, and to reveal their structure without showing their bones. This, in effect, is the major thesis in our philosophy of so-called modern architecture.

Proportion, the relation of the parts to the whole, is the basis of the design of each of these buildings. This came as a result of careful study of the division of the parts of the structures. The problem was then to elevate simple concrete walls, using natural divisions of the plan to locate accent notes for the relief of broad wall areas. In the case of the Detroit building, glass brick windows located at the ends of the principal aisles divide the long wall into three plain surfaces, and the shorter wall into two.

Concrete is used in all of the buildings to produce relatively smooth wall surfaces. The characteristic texture of concrete, which is appropriate to these designs, is achieved through the use of forms of plywood panels. When wide, plain wall areas are desired careful formwork is necessary, and is best assured by detailing an orderly arrangement of the panels before the work is started, thus keeping irregu-

The parapet above the ground-level display windows forms an accent note, giving a strong horizontal feeling to the building. This feature is common to all the new Sears stores.





A typical Hollywood touch was the use of great searchlights at the opening of the Glendale, California, store. The masses of the building are revealed at night by generous use of floodlighting.

larities to a minimum and cutting down time required for erecting forms. The finish is a wash of light-colored paint.

An interesting feature of the Detroit building is the band of V-shaped detail at the coping, not because it is an unusual pattern—for it is simple—but because of the part it is expected to play in the weathering of the concrete wall surfaces. Many architects dread the time when streaks caused by water, dust and soot form on the walls of their buildings; but in this case we anticipate it with interest and can hardly wait for it to happen. We expect streaks to occur at the bottom of each V, starting rather dark in color at the coping and grading out to light at the bottom of the wall. With the occurrence of these streaks controlled, the effect should be good. Since it is practically impossible to devise detail that will not streak any kind of material subject to the dust and dirt of industrial cities, the designer should make an effort to control it and achieve an esthetic effect.

Comparison of both the Glendale and Detroit buildings with renderings of the projects will indicate that neither structure has been completed, as now built, but awaits the need for more space to go ahead with construction of final stories. Both of these top stories will contain bands of glass brick windows which will finish the line of the walls and fill in the masses that are now incomplete. Column stubs have been left above the roof slab in both buildings for the additional story when needed.

One other design feature is common to all of the new Sears buildings. That is the parapet above the display windows on street facades. While this parapet has a definite

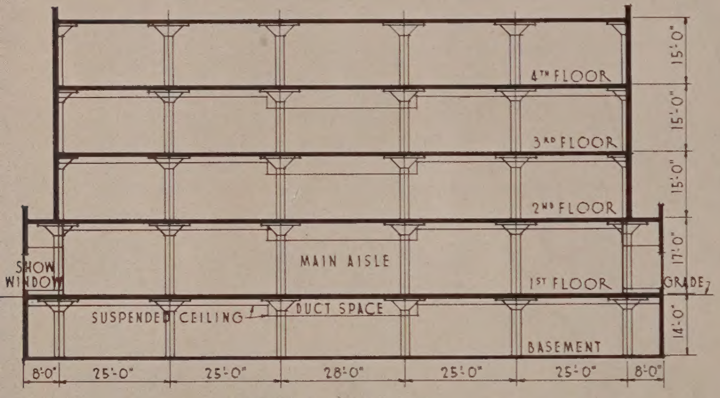
Walls were cast against plywood panels and finished with paint.

decorative effect in that it provides a dark line of contrast when the windows are lighted and the main walls are floodlighted at night, it was devised for the practical purpose of achieving uniform column spacing. By erecting the main walls about 9 ft. back from the street line of the buildings, the outside aisles and large counter space are contained in the first bay without requiring a wide column spacing to accommodate both display window and aisle. This is a very practical consideration because the first floor and basement are the money-making areas of any store of this kind.

Despite the use of some glass brick for display and decorative purposes, these are essentially windowless structures. All are completely air conditioned and depend on artificial light for interior illumination. Although buildings without windows are no longer novel and probably need no defense, we have felt that they are probably much more protected against fire than a building with many openings. The great walls of concrete are a barrier to flames from the outside, and the structure itself comprises so little burnable material that flames originating inside will be easily handled by the sprinkler system.

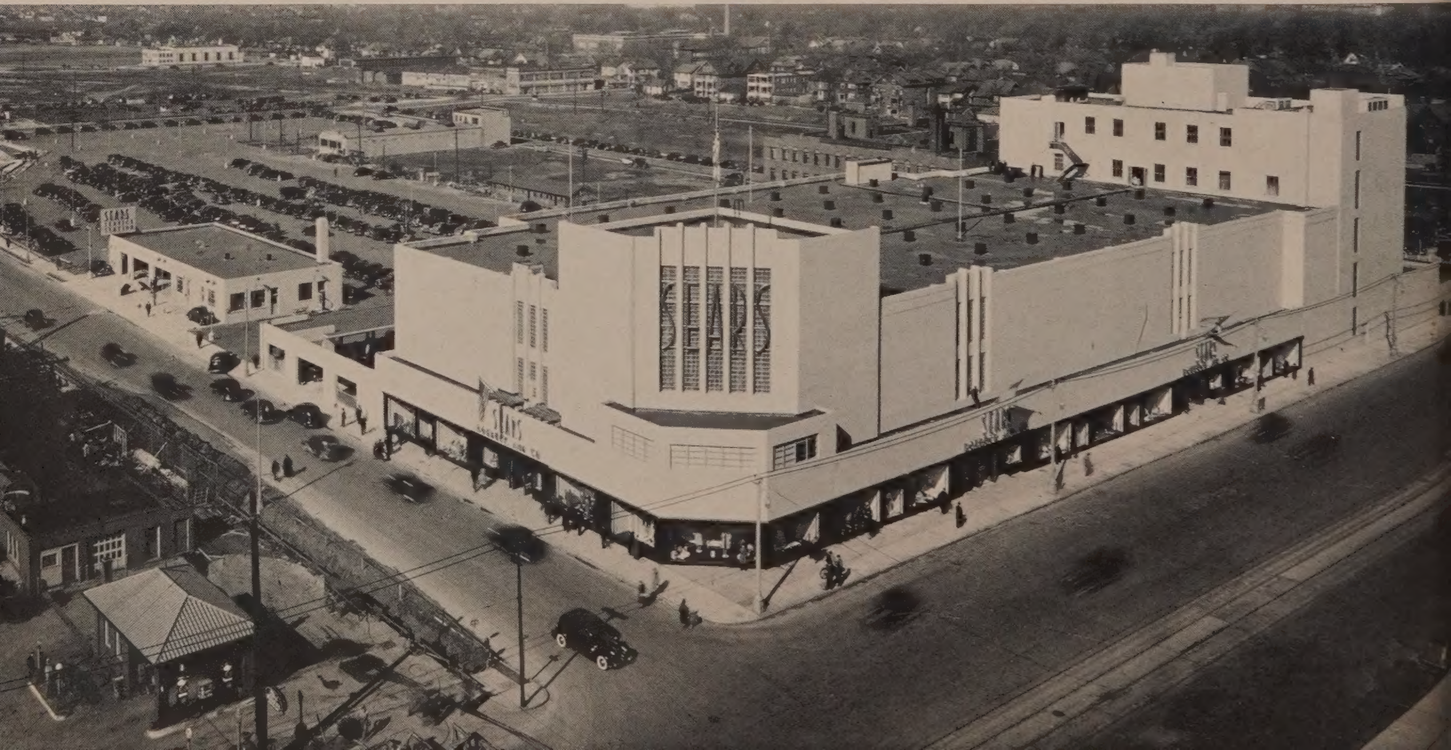
Concrete, which performs so nobly as a structural material, apparently has no limitations as to the forms it can assume, and the architect is quite free to proceed with it as he pleases. It is our feeling, however, that this material expresses itself most characteristically when it is kept to simple forms which, after all, are the most economical. When concrete buildings are designed with the construction processes in mind, beautiful and effective structures are produced. They justify the belief that concrete is a building material of many uses and that none may deny it a place in the American scene.

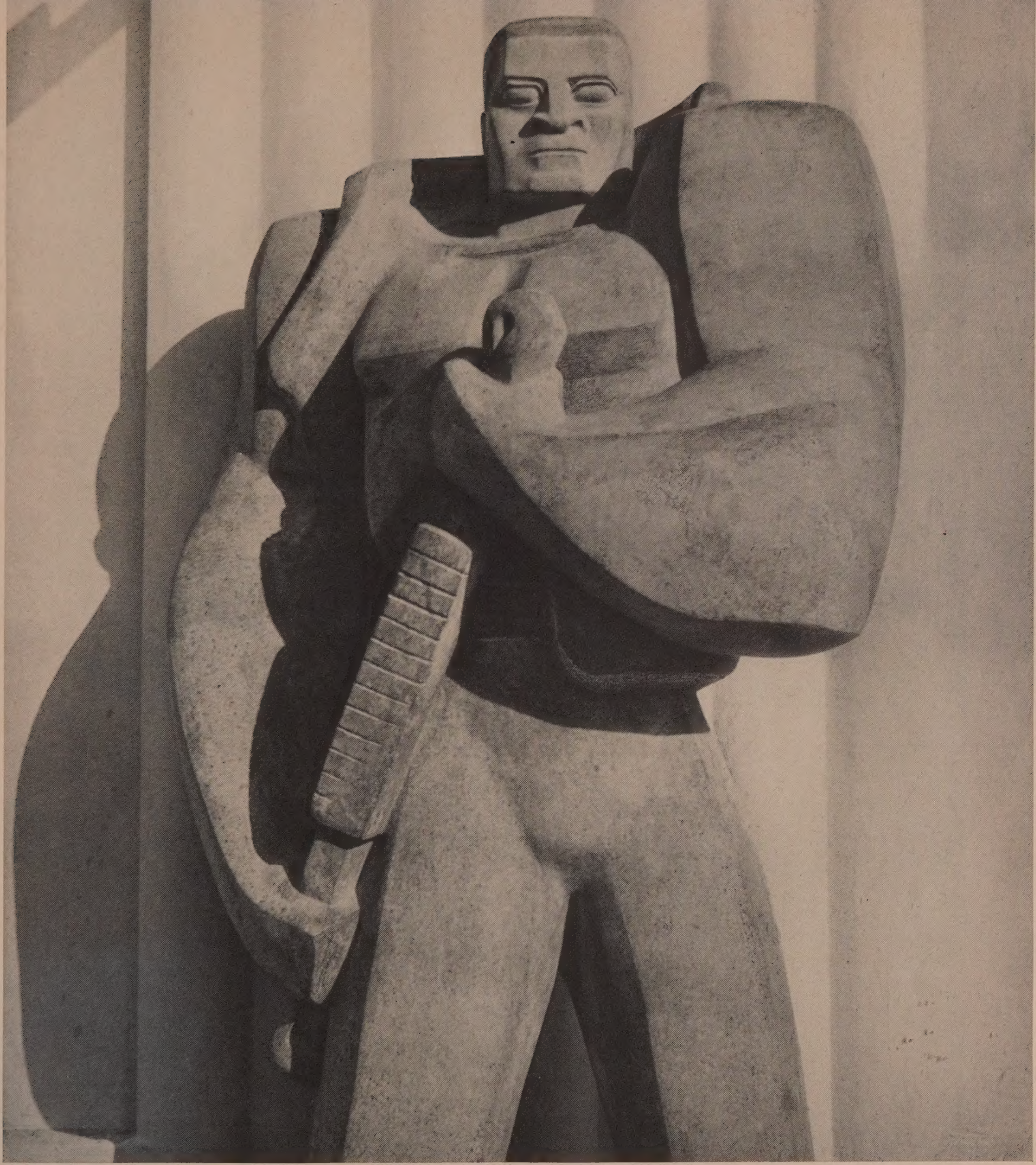
This is typical of the interior finish and arrangement of all the new Sears stores.



DIAGRAMATIC SECTION

View looking down on top of Highland Park store shows column stubs exposed for use when final story is added in future. The small service station at the left is a merchandising feature of all the Sears buildings.



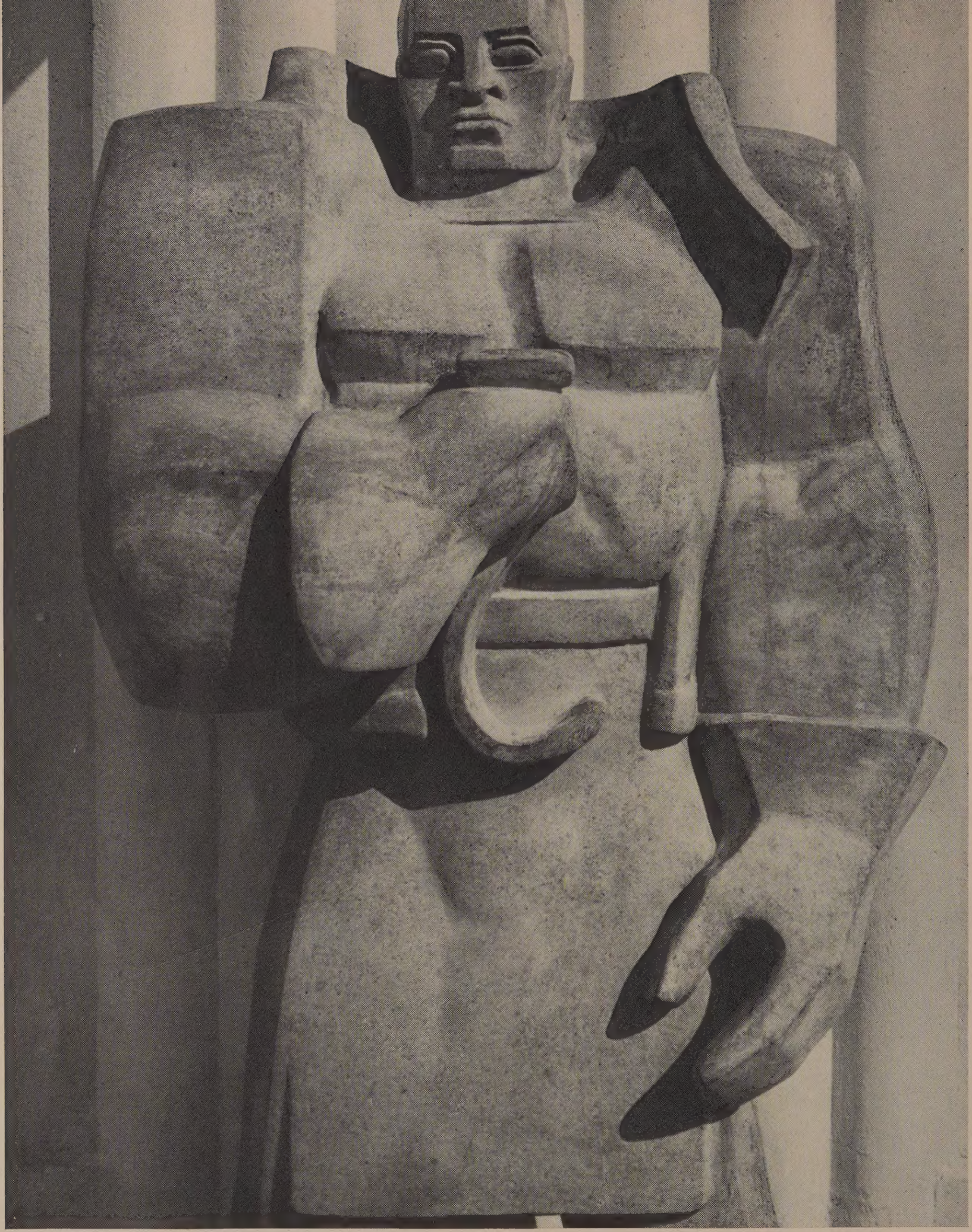


One of Sculptor Warren Cheney's concrete figures on the Teamsters' Union Building, Oakland, California.

Modern Sculpture—in Concrete

By Warren Cheney, Sculptor

CONCRETE was chosen for the sculptures on the Oakland Teamsters' Union Building because we were pressed for time. Although at first I was opposed to using anything but real stone, after investigating the weathering properties of properly-mixed concrete, I was ultimately convinced that concrete is the medium for most architectural sculpture. Tests show that concrete weathers as well as any stone—granites and allied hard materials being the



After the mold was stripped away, the concrete surface was finished by means of stone tools and abrasives.

only substances that will outlast concrete. Furthermore, because concrete sculpture is made from full-size clay models, the sculptor has the great advantage of being able to refine forms and proportions indefinitely, whereas cut stone allows virtually no changes after the forms are once set.

The large figures, which are 8 ft. high and weigh 1½ tons each, were modeled in clay very close to the final form desired. Then plaster molds were taken and the concrete placed. After sufficient time had elapsed to allow the concrete to harden, molds were removed and the figures were given their final precise form with stone tools and abrasives. In other words, I achieved the finished surface just as I would had the sculptures been stone.

As the photographs indicate, a rather interesting surface resulted, since the carving and polishing process removed the "dead" skin which forms where concrete meets the plaster mold, and brought out the true texture of the travertine aggregates as well as the rich warm color.

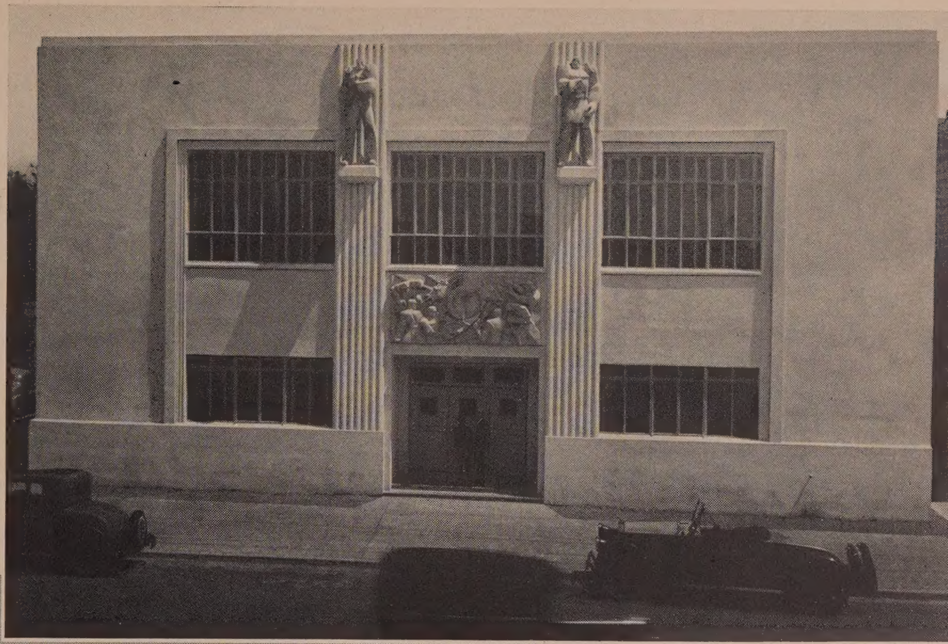
AKLAND TEAMSTERS' UNION UILDING, Oakland, Calif.

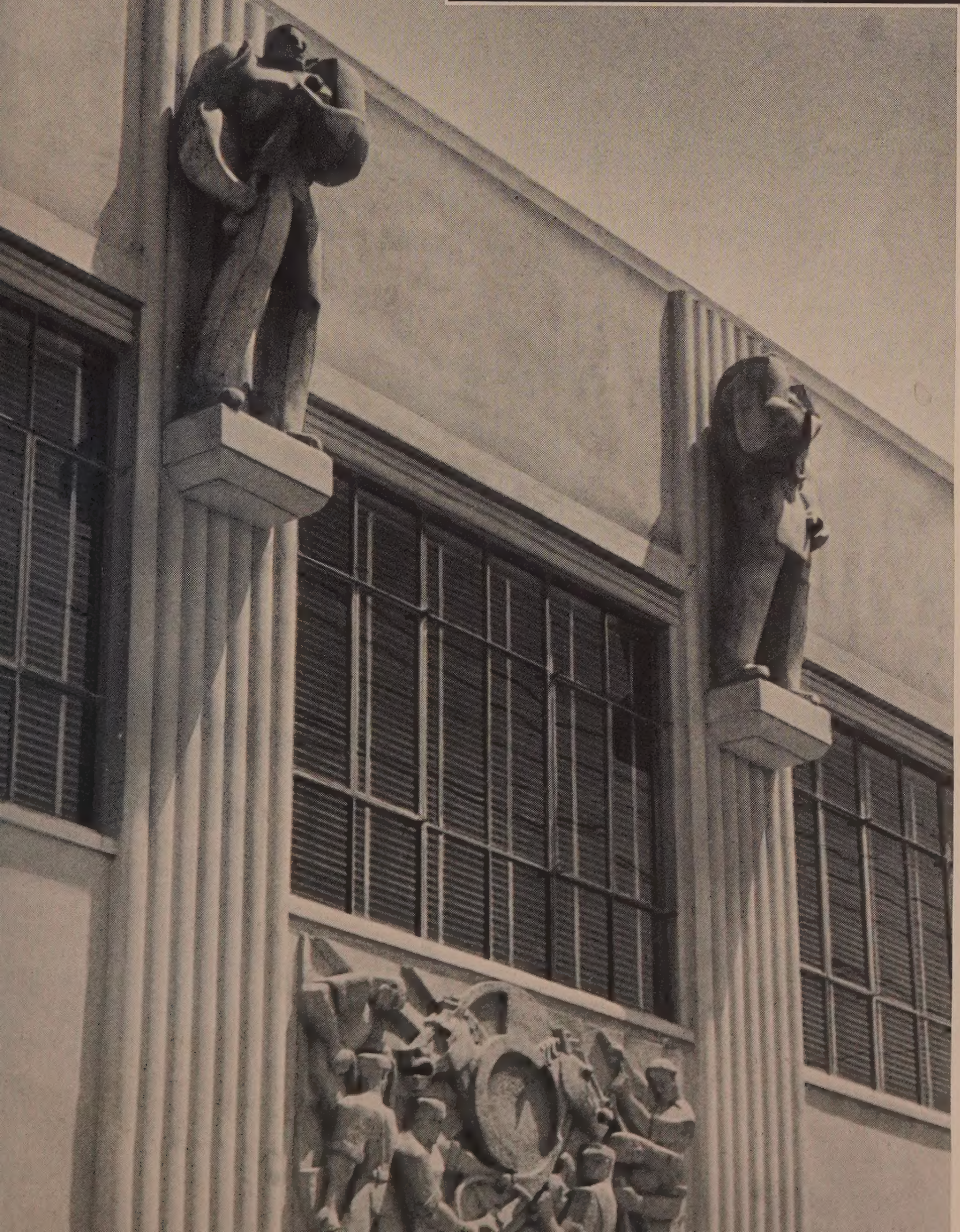
ohn B. Anthony, Architect

hn Tulloch, Contractor

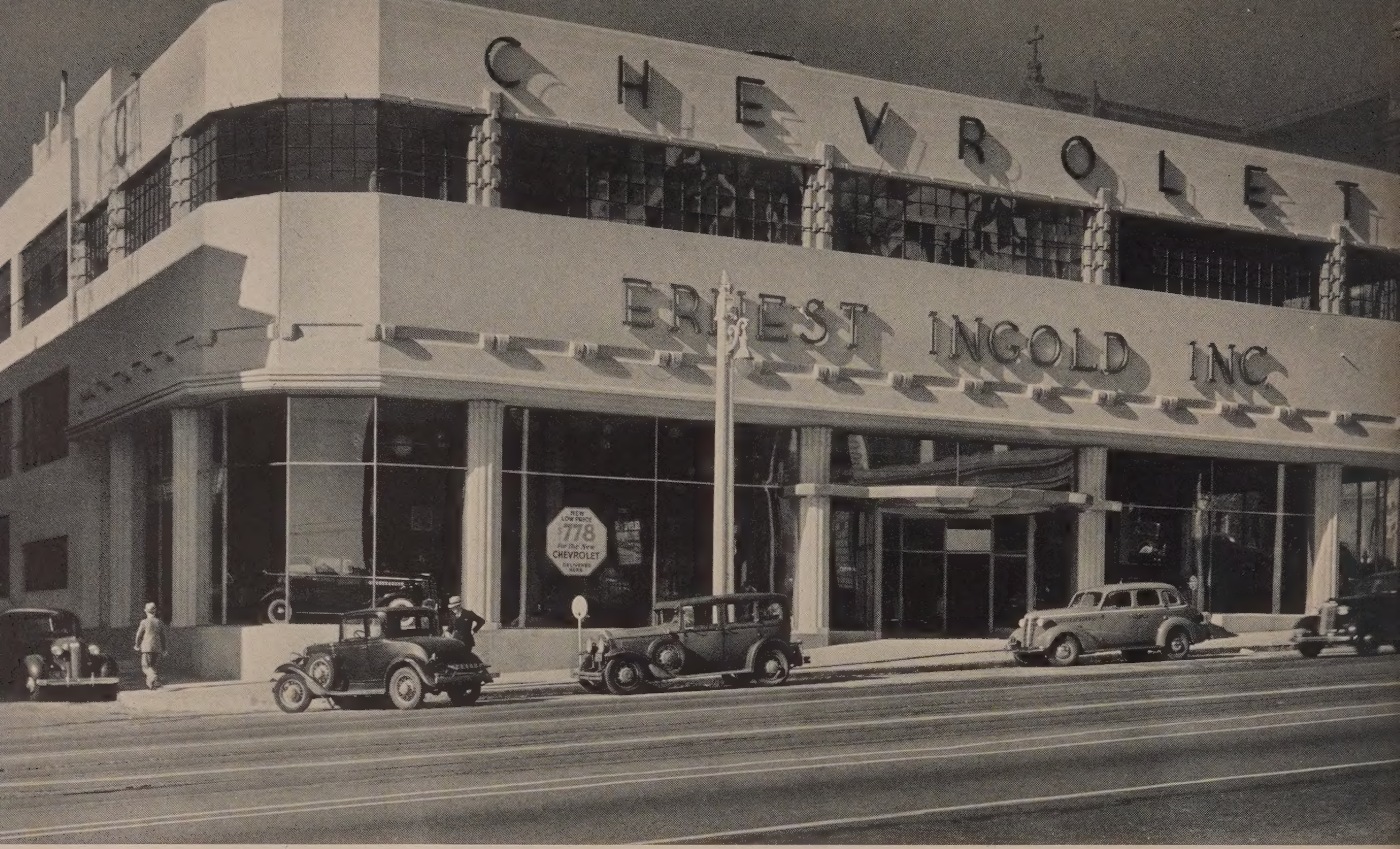
arren Cheney, sculptor of the large gures.

lliott Sandow, sculptor of the relief.





The illustrations on this page reveal the relation of the sculptured figures and relief work to the simple facade of the comparatively small building.



Large, attractive sales space and efficient service quarters were the main objectives in the design of the Chevrolet sales building in San Francisco, built for Ernest Ingold, Inc. John Ekin Dinwiddie, architect; R. J. Fisher, structural engineer; Barrett & Hilp, contractors.

Sales and Service a la Mode

By John Ekin Dinwiddie, Architect

THE design of a Chevrolet Sales and Service building for Ernest Ingold, Inc., recently completed in San Francisco, represents an honest attempt to reconcile four sets of conditions: the peculiarities of the site, the display and advertising possibilities, the service facilities required, and last but not least, the budget.

Following the accepted trend of the design in this type of building, the service department received first consideration. This was planned for ease of entry and exit from side streets where traffic was less congested; and due to the steep uphill site, the main service floor of necessity came at mezzanine level. Display of new cars, because of the dramatic advertising value of the site at the heart of San Francisco's "automobile row," was given more emphasis than is currently considered necessary. Display space occupies the entire Van Ness Street front and extends two stories in height. The rear of the first floor, under the mezzanine, is largely underground and is devoted to new car storage and preparation for display and delivery.

Auditing offices and bookkeeping room, located on the mezzanine floor, form a partial separation of the service departments from the display area. Inasmuch as most people driving to the building would enter on the mezzanine level into the service department, an attempt was made to provide some display at this point by opening the view into the salesroom by means of glass partitions. Thus, the customer arriving for service is provided an interesting display and a comfortable place to wait, and is influenced to continue into the display room to inspect new models.

Similarly, prospective buyers are influenced to see the display on the balcony at mezzanine level and at the same time become acquainted with the extraordinary facilities provided for car servicing. It has been found that the service facilities are of great importance in this respect, particularly where there are several agencies for the same automobile in the city.

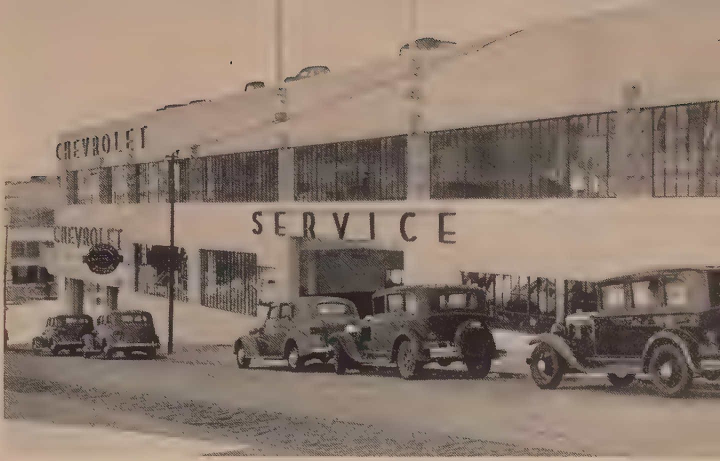
The third floor is devoted to heavy repairs, painting and parts storage. The latter department is located directly over the parts display on the mezzanine, thus bringing it close to three sources of demand—customer purchase, light repair and service, and heavy repair. Overflow storage space is provided by the roof which was so designed that another story may be added if desired. Communication between floors is by ramp and stairs, elevators being considered uncertain because of the danger of shutdown due to power failure.

Proper coordination of the foregoing conditions was what determined the entire design, and with the limitations of the budget, careful selection of the most effective and economical materials was essential.

Reinforced concrete, it was decided by R. J. Fisher, the structural engineer, would be the most economical method of constructing a firesafe building. With this determined, the opportunity at once presented the elimination of corner columns on Van Ness Street, leaving this space open for display.

The original plan called for columns 22 ft. on centers with flat slab floors. This would have been satisfactory and allowed less floor-to-floor height. The owner, however, felt that wider spacing would greatly facilitate service work and car movement. After determining that 27-ft. centers would be necessary for working comfortably on three cars between columns, beam-and-girder construction was employed although the cost was increased somewhat.

interior was designed to display many cars in dignified surroundings.



The service entrance, due to the site, is located at mezzanine level. Ramps lead to the top floor and storage roof.

All stairs are concrete except the circular stair to the balcony. It is interesting to note that many details originally planned for other materials, such as stairs and partitions, were changed to concrete when it was found to be no more expensive than other materials.

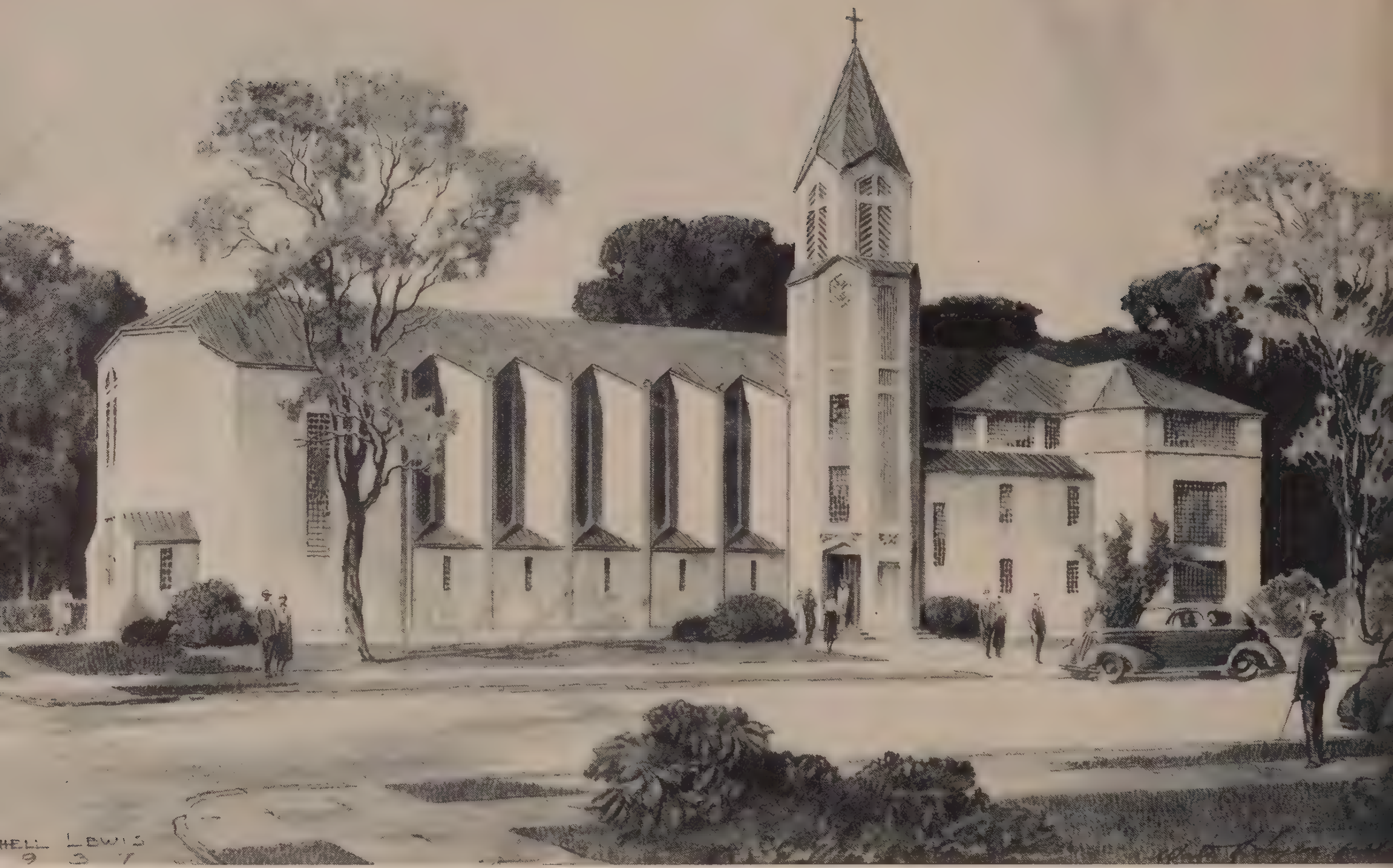
Floor surfaces were designed for both appearance and service. Integral coloring was used in the floors throughout the building, except in the display room and office where tile and carpet were applied directly to the slab.

For the service portion of the building, plywood forms were used, giving a clean, smooth surface that required only paint for satisfactory finish. Wherever possible the concrete was left exposed, both for the sake of economy and because the architect wished to develop the natural and characteristic beauty of the material. Where veneers were necessary, they were frankly veneers with no attempt to suggest strength or structural quality.

Exterior concrete walls were given a stucco finish. Columns were placed against plaster forms and all detail and ornament cast in place to effect a simple, integrated appearance. The rather dramatic use of detail on the facade was for the purpose of enhancing the advertising value of the building. The base course of cast stone on the street facades has the appearance of polished black granite.

Steel columns and 42-ft. span girders support the concrete of the second floor above the salesroom. In the interior of the salesroom and office, a rich contrast was obtained between the concrete and plaster colors by the use of simple wood and tile surfaces and bronze fixtures and railings.

On the whole, the building is an interesting example of what can be achieved when effort is made to bring out the natural beauty of simple materials simply used. It has proved its case in the sales value of the building and the extraordinary amount of business done since the building was occupied.



Architect Walter A. Taylor's "Twentieth century fireproof church" incorporates many unusual ideas both in plan and architecture. He proposes a concrete structure with all services—worship, social and civic—under one roof, so flexible that all of its parts can have interchangeable uses. The rendering and plans illustrating the article are copyrighted, 1937, by the architect.

'Fireproof Church—20th Century Style'

By Walter A. Taylor, A. I. A.*

THE desire to build monumental structures of fire-resisting or fireproof construction has been the concern of architects in all ages. The earliest notable success was achieved by the Romans in their vaulted baths and basilicas of mass concrete. The remnants of their engineering technique survived the Dark Ages and were a starting point for further development in the early Middle Ages.

In this architecture which we now call Romanesque, we see the beginnings of the refinements and structural ingenuity which led to the architectural and engineering triumphs of 12th and 13th century work called Gothic.

A desire for fireproofness and permanence, of course, persisted through all these centuries. The natural cements used in Roman mass concrete were not generally available in the wider regions of the Romanesque: stone remained the only fire-resistant material.

Since the Church had become the dominant institution in Europe it could command the resources necessary to build the monumental firesafe structures which it required. Increasing facility in stone engineering and the growing complexity of the Church's ritual requirements each stimulated the other to provide or require greater ingenuity and elaboration of the church building—in plan, structure and space effects.

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*Consultant, Interdenominational Bureau of Architecture, and Lecturer in History of Architecture, Columbia University.

The well-developed Gothic style of the 11th and 12th centuries, before it became engulfed in the exuberance of its ornamentation, was essentially a great achievement in stone engineering, a practical and functional solution of the problem of a firesafe church building of the type required by the Church of that time. Principal architectural forms were determined either by the structural necessities of the material, or were designed to harmonize with those structural forms. Windows and other openings derived their shape from the pointed arch which had been invented or imported to help solve the problems of stone vaulting over irregular areas.

During the past century many hundreds of churches have been built in America purporting to be in the Gothic style of architecture. The Gothic style had died out in Europe, as a normal mode of building large churches, and was quite foreign to America. Early in the 19th century, it was artificially revived by a romantic literary movement in England, which spread to this country and resulted in the building of a few good examples and a thousand atrocities. Most of these alleged Gothic buildings are of ordinary 19th or 20th century frame or brick construction with roof trusses, having pointed arched openings punched through the walls and adorned with ill-selected Gothic moldings and plaster vaulting imitating stone.

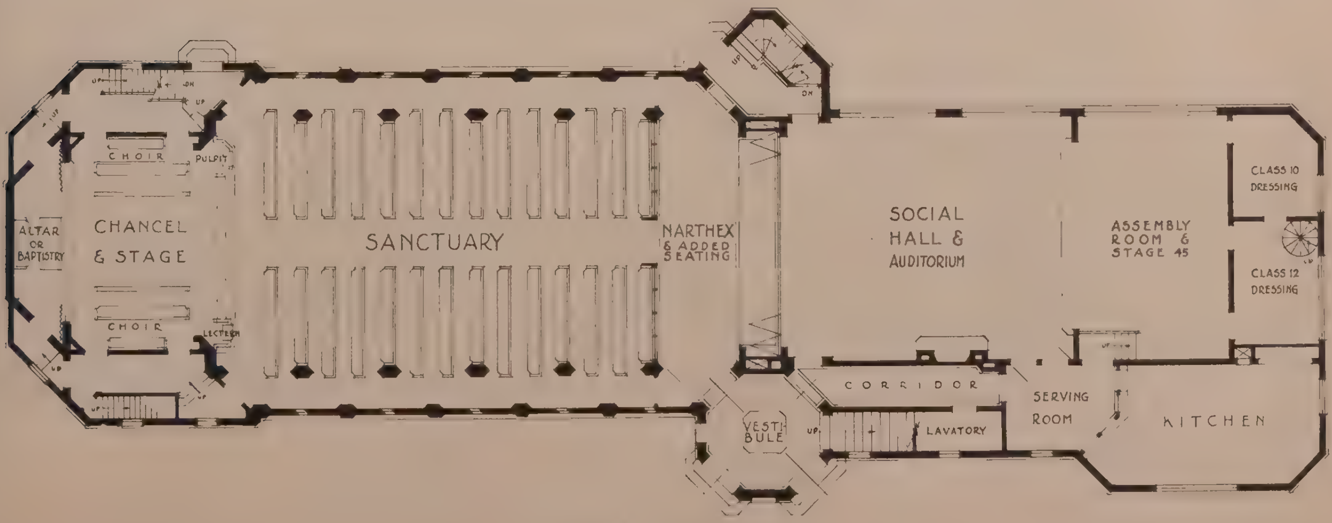
Although the Gothic revival has been strongly stimulated during the past 50 years by literary propaganda, churches built on Gothic structural principles are rare. The Washington Cathedral and the Cathedral of St. John the Divine, New York, are notable examples, the latter including in its design original contributions to the Gothic tradition. However, this mode of construction is in this era an abnormal tour de force, too costly to be considered for general use.

The erroneous belief in the special efficacy and appropriateness of Gothic as a Christian style has been so thoroughly inculcated that a number of contemporary large churches are very carefully designed to give the appearance of authentic Gothic construction, but are really a costly and meaningless camouflage of complicated vaulting and hollow buttresses which support nothing, being hung on 20th century steel skyscraper frames.

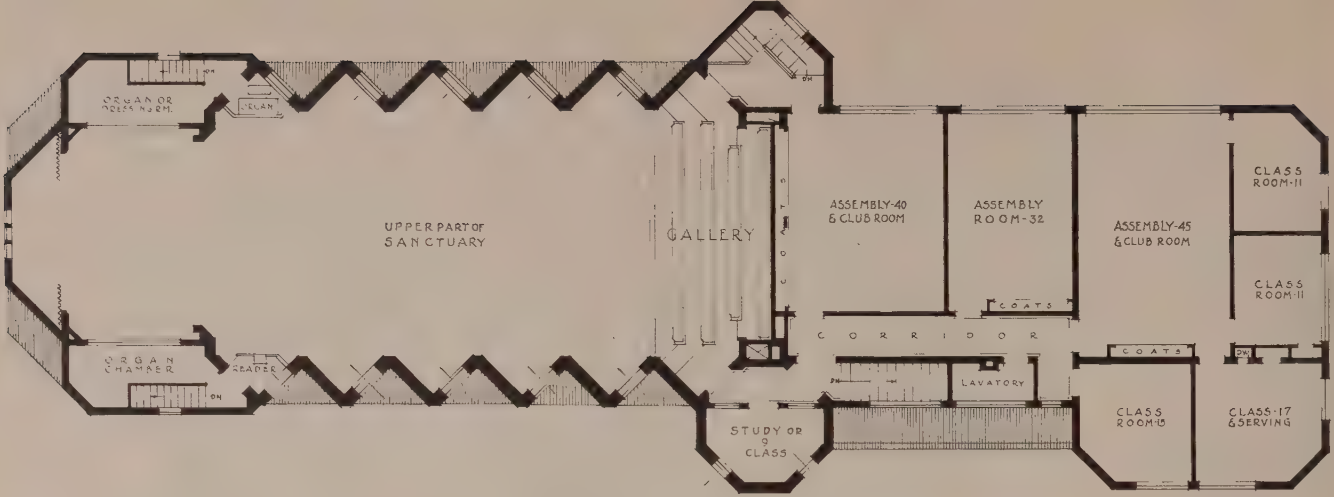
If we are to have vital church architecture today we must cease toying with archaeology and sentimental stage scenery and return to basic principles and procedure. What would be the result if we were to try to do this in the case of a small Protestant church for an average American town?

The program and plan requirements of this church are quite different from those of a 13th century European church. Let us take today's most adaptable fire-resisting structural material—reinforced concrete. Let us utilize methods of construction suitable to the material, familiar to builders and adaptable to the size and type of building required. Let us then apply this material and this mode of construction to the plan and other special problems of our church building. Let us look to the Middle Ages and to other periods, not for architectural forms or details, but for the basic principles of design which produced good ecclesiastical architecture: scale, rhythm, unity, proportion, harmony of form and color, height and vista. Guided by these principles and with judicious use of decoration appropriate to the church and to the material, we will endeavor to make this a beautiful and worshipful church. The design shown herewith is one possible result of such an approach.

The following considerations, derived from extensive experience with the small church problem, will serve to explain some of the features of the plan, most of which the



FIRST FLOOR PLAN



SECOND FLOOR PLAN

designer has utilized successfully in churches already built.

At one time a church required only a sanctuary for Sunday worship. As additional spaces were required they were regarded as incidental and were attached to the platform end of the original structure, or were allocated to a primitive, unhealthful basement. Unfortunately, this unarchitectural, accumulative plan is often perpetuated in entirely new buildings. The progressive church of today has a seven-days-a-week program of religious education, social and recreational activities in addition to worship. These require special building provisions and have important inter-relations calling for a carefully integrated plan. Few churches can afford to build special rooms for every type of activity; therefore, every major space must be arranged and equipped for duplicate or multiple use.

On two or three occasions during the year the seating required for worship is twice that of the average for other occasions. To avoid the extravagance and bad effect of many empty seats 50 Sundays of the year, overflow seating must be provided in spaces normally used for other purposes, arranged for visibility and hearing, without doing violence to the architecture of the sanctuary. In this plan the worship-seating may be increased from a main floor capacity of 186 to a total of 365. Similarly, the social hall may be enlarged from 90 capacity as a parlor, to 250 as an auditorium or theater. The stage and four dressing rooms do double duty as Sunday School assembly and class rooms. Altogether the building provides assembly and class rooms sufficient for ideal teaching conditions for a graded Sunday School of 250 children, the assembly rooms serving also as class and club rooms for other groups.

Most Protestant congregations object to the "dim religious light" of medievalism, and also object to glare from windows large enough to provide reading light at all pews. The answer would seem to be to turn the main windows out of the normal range of vision, providing ample light over the shoulders from the rear, and tending to lead the eye forward into the chancel.

Aisle piers reduce the structural span, resulting in a better-proportioned section for a given height, and add architectural interest. Piers in line with ends of pews permit unobstructed vision from every seat. Alternating the main piers on either side of the aisle, taking three pew-spacings as a bay, produces a satisfactory width of aisle and a minimum number of short pews occurring at regular intervals. In effect, the aisles penetrate the lower parts of the 45-degree accordion walls, the outside of the aisle being enclosed by a straight wall and triangular portions of pitched roof.

A pitched roof is functional and logical in most parts of North America. The roof slab, copper covered, in two continuous planes, intersects the accordion wall in an interesting pattern, enhanced by a decorative metal gutter-cornice leading to metal ante-fixae or leader heads. The leaders are cast in the outer piers.

Main roof construction is of cantilevered girders from opposite inner piers, carrying a continuous uniform slab designed to act with the girders as T-beams, the knee-brace cast integrally in a decorative form. The reinforcing of the upper wall is carried into the lower part of the roof slab, tying the whole system to the outer piers. This distribution of stresses is relatively easy of accomplishment in reinforced concrete, is expressive of the plasticity of the material and roughly analogous to the buttressing of a Romanesque or Gothic structure.

The actual angle of the roof intersection in the plane of the wall being 30 degrees, the window head is of hexagonal shape, and the whole window may be built up of hexagonal structural glass units. This shape, derived from and harmonious with the structural lines, is used for other openings.

The tower, which serves to elevate the broadcasting chamber above the church and surrounding buildings, emphasizes the main entrance by a strong vertical opposed to the horizontal mass of the building.

Drama grew out of religion both in pagan classic lands and in northern Christian countries. Drama seems to be again taking its place as one of the handmaidens of religion. Dramatic performances of suitable character are now frequently given in the sanctuary as a part of the services or worship. For this reason all the chancel furniture, including the pulpit, is removable. A permanent reader's balcony is provided above the aisle at the first bay, balanced by a balcony for the organ console.

The medieval practice of using the nave of the village church for civic and social functions, separated from the choir by a heavy rood screen, is here extended to include the choir stage, the altar being architecturally separated and provided with an enclosing screen.

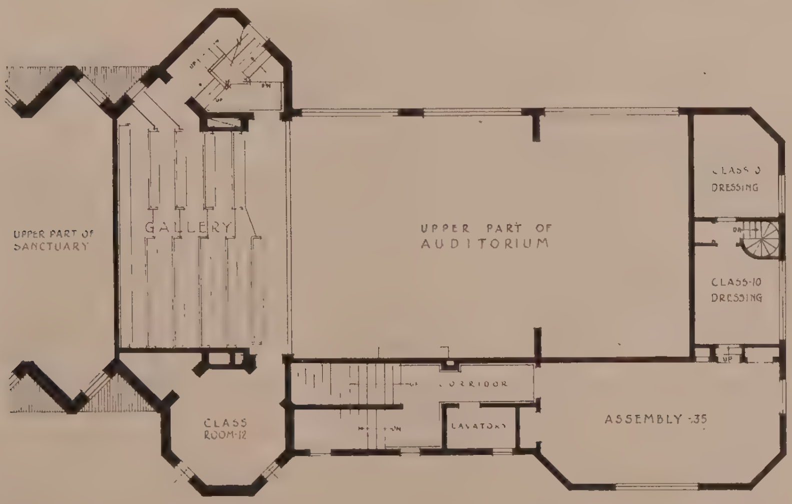
Most artificial lighting in contemporary churches is, like the architecture, a hangover from the days of candles and oilwicks. The possibilities of present-day illumination technique and equipment applied to church architecture have scarcely been touched. In this sanctuary much of the artificial light comes from strips around the windows, simulating the daytime effect, supplemented by concealed ceiling fixtures and special equipment for the chancel stage.

Varied color from the windows and lighting equipment supplements the permanent colors, integral and applied, of the walls and furnishings. Appropriate symbolic and decorative painting fills the panels of acoustical material on the wall surfaces adjoining the windows and on the ceiling.

The sanctuary has the greatest architectural interest both inside and out, and dominates the design as it should, while it shares the one principal entrance and is significantly under one roof with the other parts of the whole church building. The whole structure is unusual, not because of arbitrary effort to be different, but because in its design honest recognition has been given to actual requirements of plan, use, material and structure. It solves a combination of problems which are not solved in the routine type of church building designed more or less by force of habit. The design is functional and organic, as was the best of medieval architecture—yet, without recourse to the forms of Gothic or other style, it is unmistakably a church.

There are as many kinds of Christian church buildings as there are styles and periods of architecture. Christianity has adapted to its needs the best building mode of every period and of every land to which it has come. The recent practice of forcing the life and worship of a congregation into a copy of a medieval structure where it does not fit, or of draping the details of Medieval or Renaissance architecture over a currently engineered structure, is not characteristic of the church which, in stronger eras, has led in the creation of new architectural styles.

The typical American church building of the mid-20th century will be of the type shown here, symbolizing an institution actively concerned with the problems of its day, utilizing the best of its historic experience and contemporary technique in worship, education and architecture.



MEZZANINE FLOOR PLAN

Architectural CONCRETE

ARCHITECT · ENGINEER · CONTRACTOR

IN THIS ISSUE

GEORGE WALLACE CARR admits (page 3) that an architect's CONSCIENCE has a lot to do with changing modes in design and construction. . . . CHISELING was kept to a minimum on this project, says (page 7) WARREN CHENEY. . . . JOHN EKIN DINWIDDIE explains (page 10) a design to snare attention on AUTOMOBILE ROW. . . . It's easier to READ HYMNS in WALTER A. TAYLOR'S (page 12) firesafe church. . . . A four-page file of details on STORE FRONTS is ready on pages 17 to 20. . . . HARRY A. THOMSEN, JR., describes (page 21) a SWEET JOB in a beet field. . . . A stride from CONSERVATIVE to ULTRA in seven-league boots (page 24) by A. HAYS TOWN. . . . GABRIEL MASSENA tells (page 27) problems of building the BIGGEST LIGHT SOCKET in the world. . . . For a while he had cold feet, but then, C. I. KRAJEWSKI says (page 30), everything came out as expected. . . . "This is no place for HONEST PEOPLE," says (page 32) FRANK E. ROSS.

In Last Issue

HAROLD PARKER (not PARK) was architect for the SANDUSKY STADIUM. . . . TREANOR and FATIO, architects in Palm Beach, designed the WEST PALM BEACH POSTOFFICE. . . . Our apologies for these errors and omissions.

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Why Concrete?

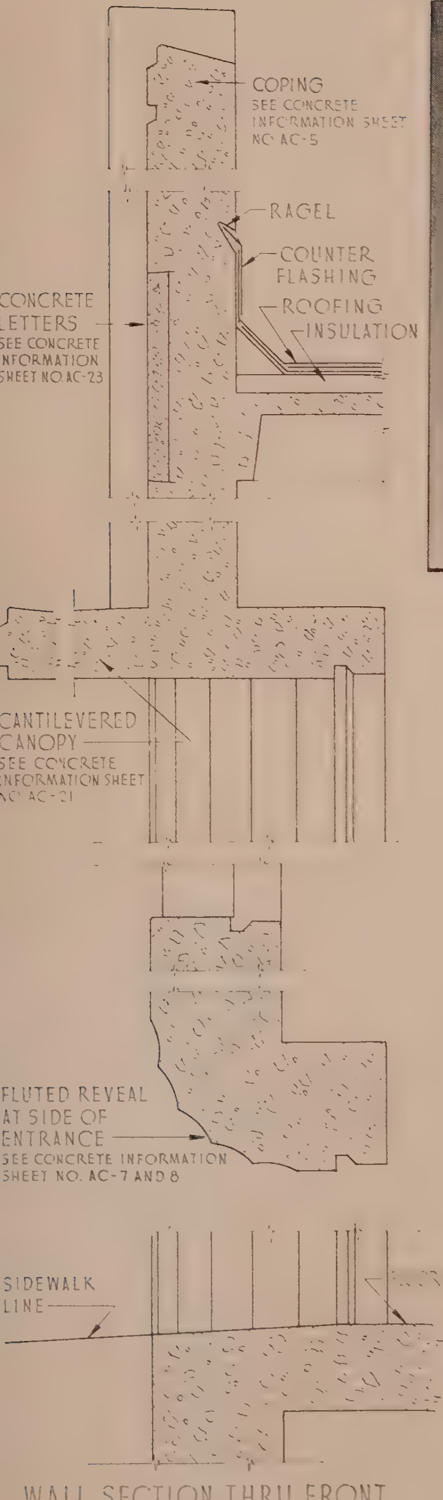
THE editors of ARCHITECTURAL CONCRETE are always interested in hearing architects and engineers tell why they selected concrete for particular projects. Except in certain localities, concrete as an architectural medium has not been used enough to have become a habit; accordingly, these reasons are a definite contribution to the development of the material.

In this issue are stated many reasons for using architectural concrete aside from the prevailing advantage of its economy. One architect sought "fresh possibilities" in the quest for saving time and money. Another, changing from conventional to ultra-modern forms, visualized his project more clearly in concrete than any other material. A sculptor, pressed for time, chose concrete for massive figures because desired results could be achieved more quickly.

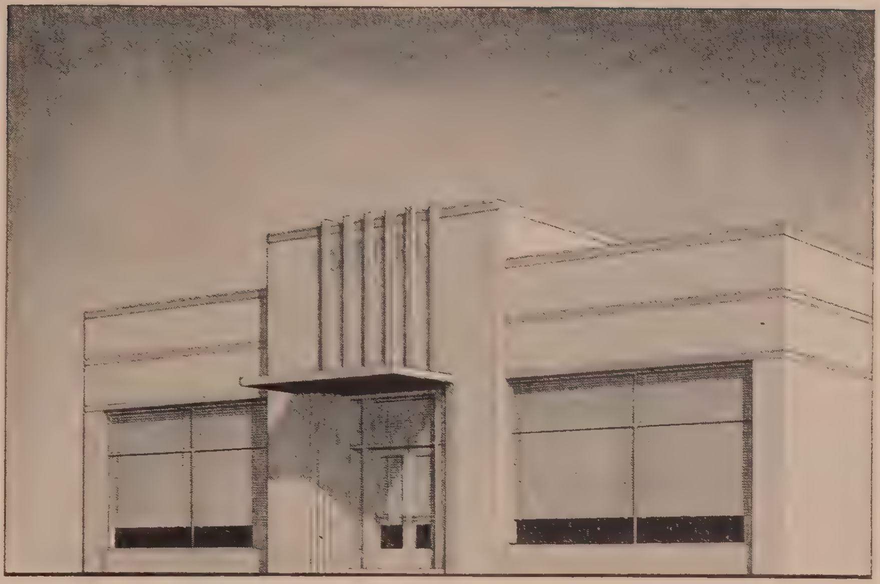
Two of the structures required a high degree of indestructibility. One, erected on made land, was designed to resist earthquakes. Another projected design anticipates concrete because it is the "most fire-resistant material known at the present time." An industrial structure became concrete because it was the only material that would harmonize architecturally with functional structures that were a definite part of the layout; and a commercial building employed concrete to produce an advertising advantage. Construction of a monumental tower, erected under difficult site conditions, was made practical and economical through the use of concrete, and it was made beautiful through the use of a decorative texture characteristic of this material only.

These are many and different reasons, and all were based on special requirements and sound consideration. Since the structures are eminently successful from both architectural and structural standards, the reasons for using concrete seem to prove more than any claims that might be made, that concrete is one of the most versatile of architectural materials.

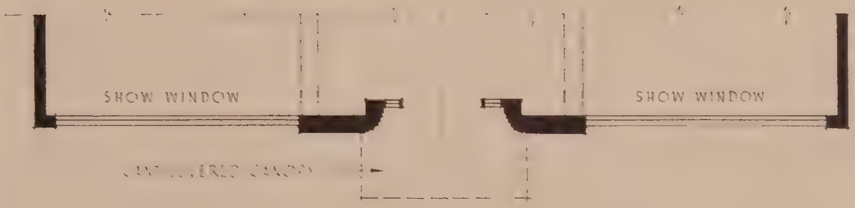
STORE FRONTS


COPING
SEE CONCRETE INFORMATION SHEET NO. AC-5
RAGEL
COUNTER FLASHING
ROOFING
INSULATION
CONCRETE LETTERS
SEE CONCRETE INFORMATION SHEET NO. AC-23
CANTILEVERED CANOPY
SEE CONCRETE INFORMATION SHEET NO. AC-21
FLUTED REVEAL AT SIDE OF ENTRANCE
SEE CONCRETE INFORMATION SHEET NO. AC-7 AND 8
SIDEWALK LINE

WALL SECTION THRU FRONT

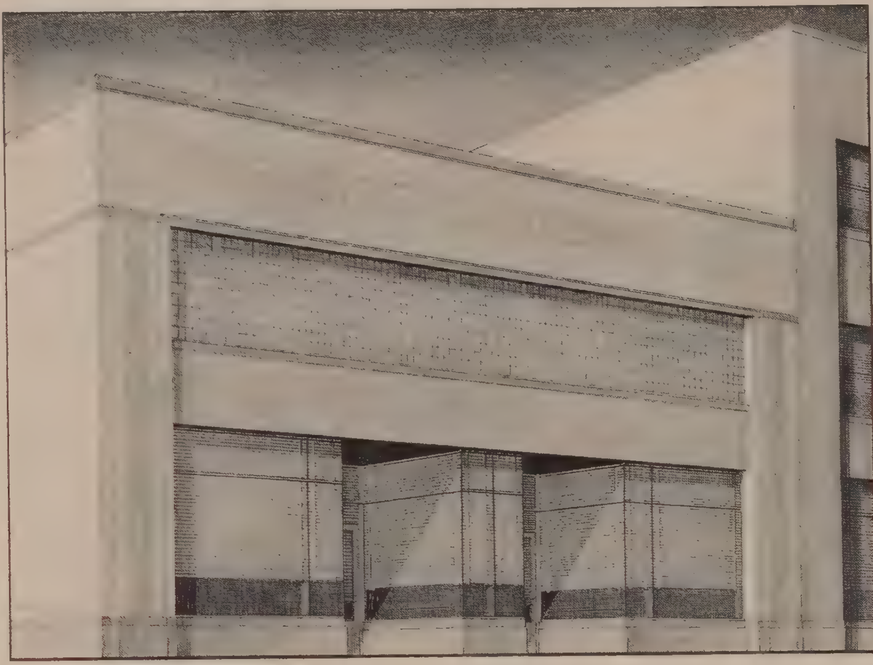


ELEVATION

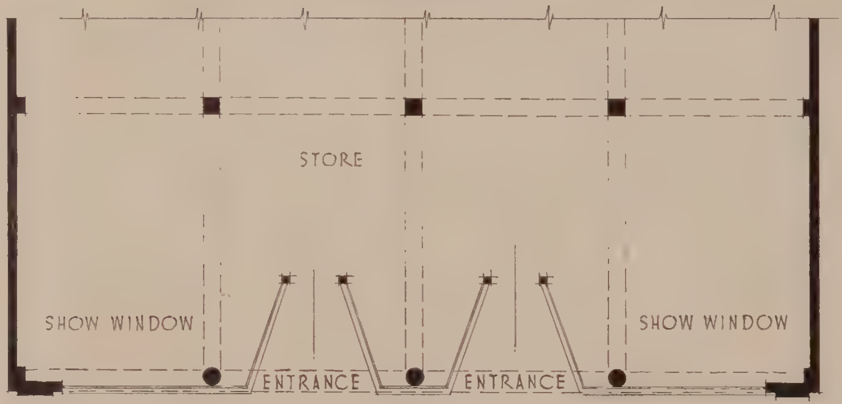


PLAN OF FRONT

STORE BUILDINGS ON THE AVERAGE INSIDE LOT LEND THEMSELVES FREQUENTLY TO A DESIGN CONSISTING OF THREE BAYS. LARGE DISPLAY WINDOWS MAY BE PROVIDED IN THE TWO OUTER BAYS AS SHOWN WHILE THE ENTRANCE IS MADE INVITING BY THE SHELTERING CANTILEVERED CANOPY AND THE FLUTED DEEP REVEALS. THE FLUTING AT THE ENTRANCE AND THE VERTICAL MOTIF ABOVE THE CANOPY CONTRAST WITH THE LONG HORIZONTALS ABOVE THE DISPLAY WINDOWS TO GIVE AN IMPRESSION OF HEIGHT TO THE BUILDING WHICH MIGHT OTHERWISE APPEAR RATHER LOW. THE DESIGN MAY BE ADAPTED TO A CORNER LOT MAKING AN UNSYMMETRICAL ARRANGEMENT BY PLACING THE ENTRANCE IN ONE OR THE OTHER OUTSIDE BAYS DEPENDING UPON WHETHER IT IS DESIRED TO HAVE THE ENTRANCE OR A DISPLAY WINDOW ON THE CORNER. THE LATTER ARRANGEMENT IS OFTEN PREFERRED TO ATTRACT TRADE FROM TWO STREETS.

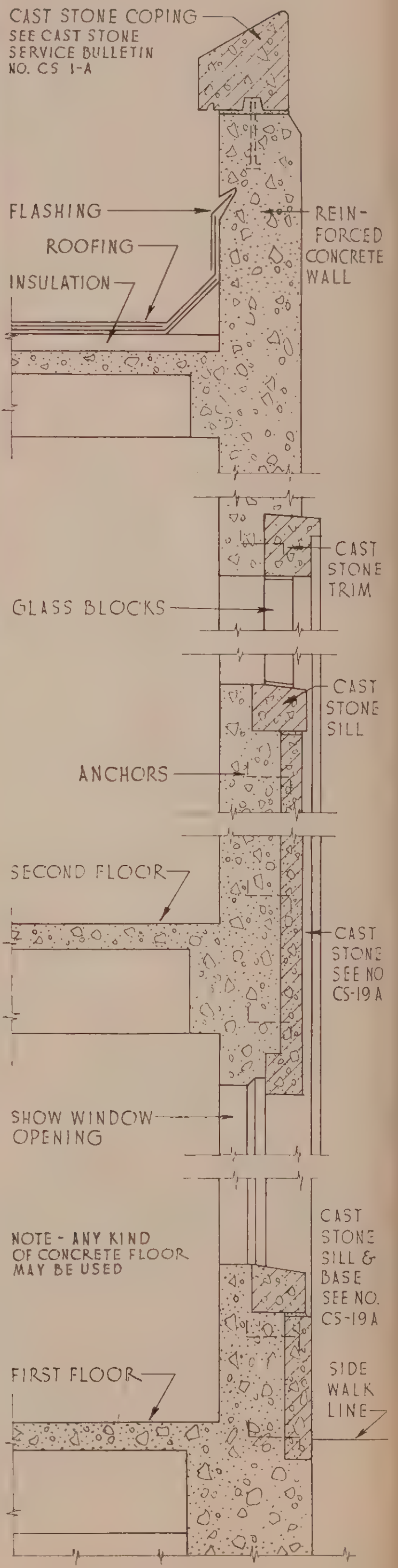


ELEVATION

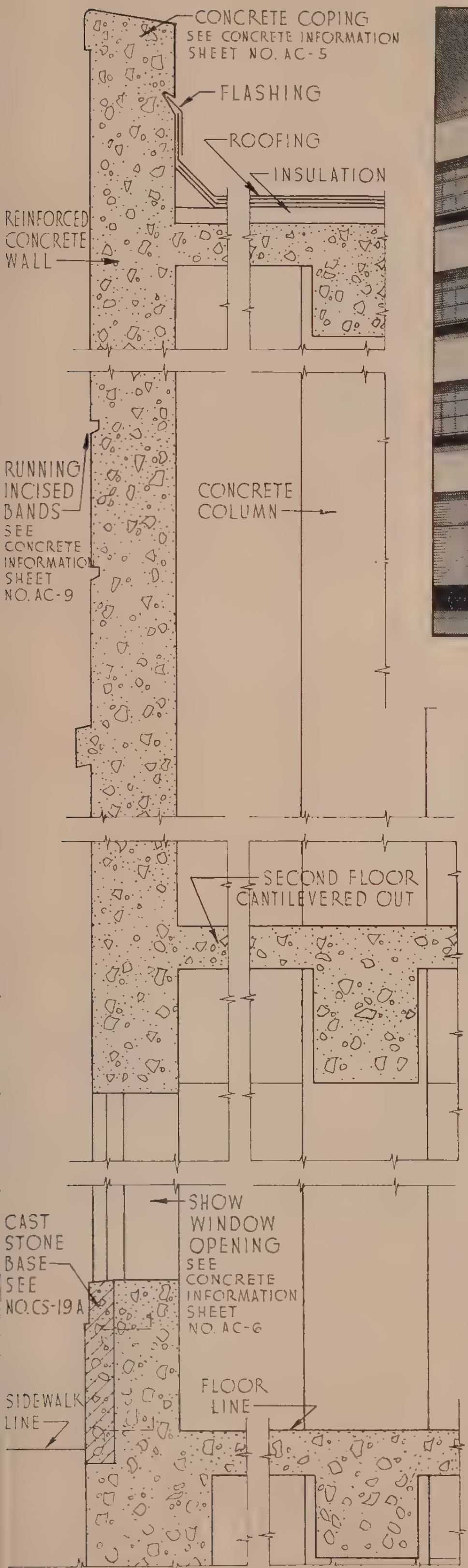


PLAN OF STORE FRONT

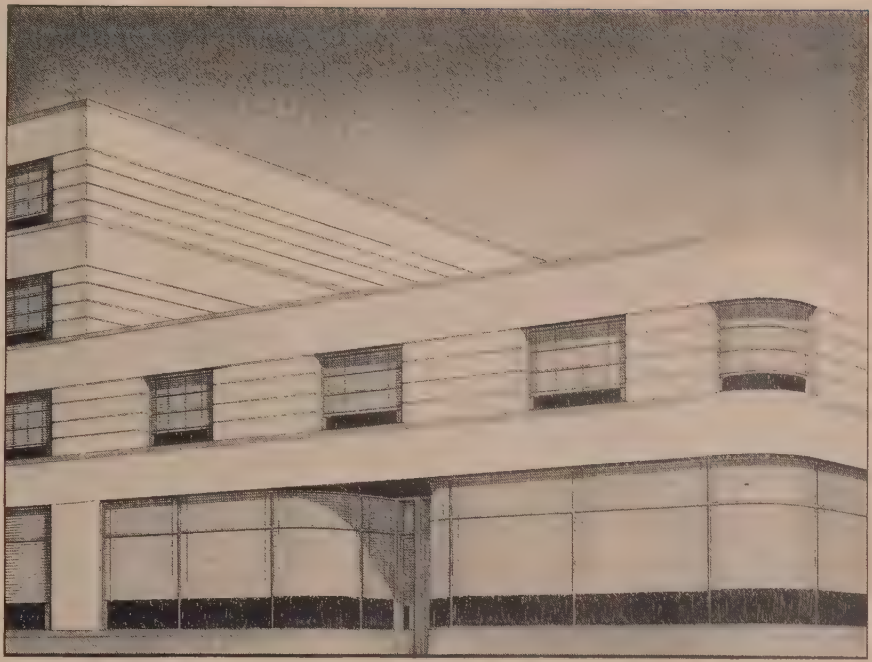
A CENTER ROW OF COLUMNS IS NOT UNCOMMON IN EITHER SINGLE OR DOUBLE STORE BUILDINGS, BUT TO HAVE A COLUMN OR MULLION DIRECTLY IN THE CENTER OF THE FRONT ELEVATION IS OBJECTIONABLE BECAUSE IT SEEMS TO DIVIDE THE STRUCTURE INTO TWO PARTS AND THE EYE IS CONSTANTLY ATTRACTED TO IT. BY TREATING THE SHOW WINDOW SPACE, IF IT IS A ONE STORY BUILDING, OR THE SHOW WINDOWS OF THE FIRST FLOOR AND THE WINDOWS OF THE SECOND FLOOR, IF IT IS A TWO STORY BUILDING, AS SINGLE UNITS, THE EFFECT OF THE OBJECTIONABLE CENTER COLUMN CAN BE ELIMINATED. THIS MAY BE ACCOMPLISHED BY PLACING THE OUTSIDE WALL COLUMNS INSIDE THE WINDOWS AND ATTACHING THE SPANDREL TO THE SIDES OF THE COLUMNS. GLASS BLOCK MAY BE USED EFFECTIVELY WHERE DIFFUSED LIGHT IS WANTED AND CLEAR VISION IS NOT ESSENTIAL.


CAST STONE COPING
SEE CAST STONE SERVICE BULLETIN NO. CS 1-A
FLASHING
ROOFING
INSULATION
REIN-FORCED CONCRETE WALL
CAST STONE TRIM
GLASS BLOCKS
CAST STONE SILL
ANCHORS
SECOND FLOOR
CAST STONE SEE NO CS-19 A
SHOW WINDOW OPENING
NOTE - ANY KIND OF CONCRETE FLOOR MAY BE USED
CAST STONE SILL & BASE SEE NO. CS-19 A
FIRST FLOOR
SIDE WALK LINE

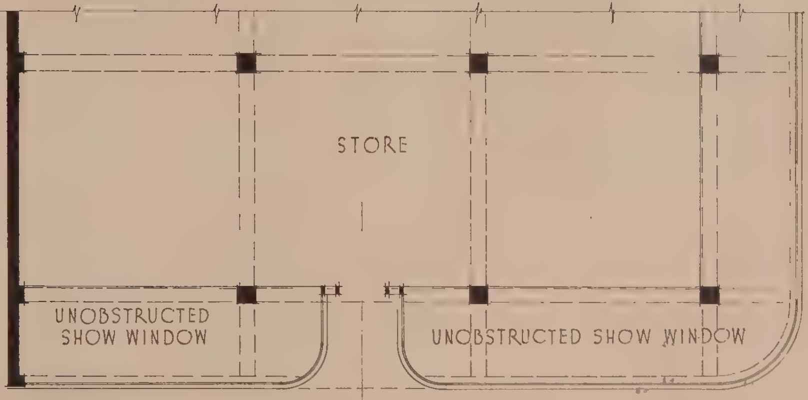
WALL SECTION THRU FRONT



WALL SECTION THRU FRONT



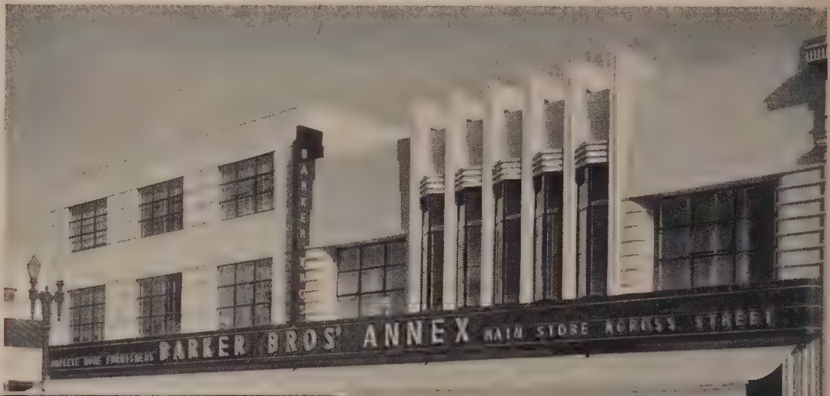
ELEVATION

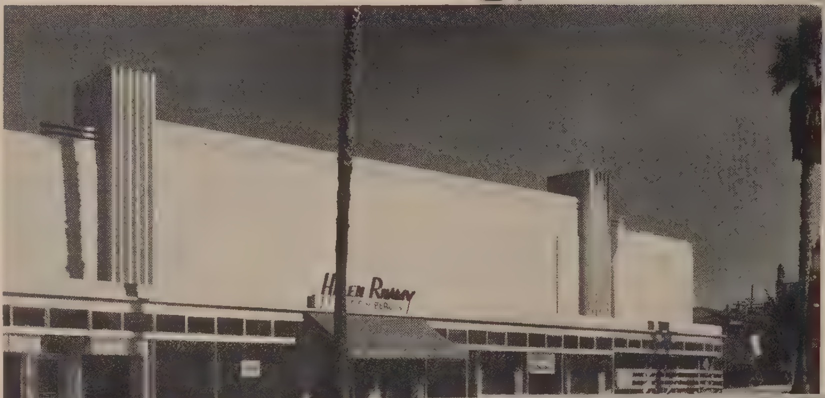


PLAN OF SHOW WINDOW

AS STORE BUILDINGS ARE FREQUENTLY DESIGNED THE OUTSIDE AISLE AND SALES SPACE ARE REDUCED BY THE DEPTH OF THE DISPLAY WINDOWS BECAUSE THE COLUMN SPACING IS UNIFORM FROM FRONT TO BACK OF THE STORE. IF THE EXTERIOR BAY IS MADE WIDE ENOUGH TO INCLUDE THE DISPLAY WINDOWS AND STILL LEAVE THE NORMAL WIDTH AISLE AN UNECONOMICAL SPAN RESULTS. BY LOCATING THE FIRST ROW OF COLUMNS AT THE BACK OF THE DISPLAY WINDOWS, THE FLOOR OR ROOF ABOVE CAN BE CANTILEVERED OUT TO THE BUILDING LINE AND THE NORMAL COLUMN SPACING USED FOR THE FIRST BAY WITHOUT REDUCING THE AISLE WIDTH OR SALES SPACE. THE CANTILEVER CONSTRUCTION HAS THE ADVANTAGE OF ELIMINATING ALL WALL COLUMNS AND PERMITTING ENTIRE FREEDOM IN ARRANGEMENT OF DISPLAY WINDOWS, ENTRANCES AND WINDOWS IN THE SECOND STORY.

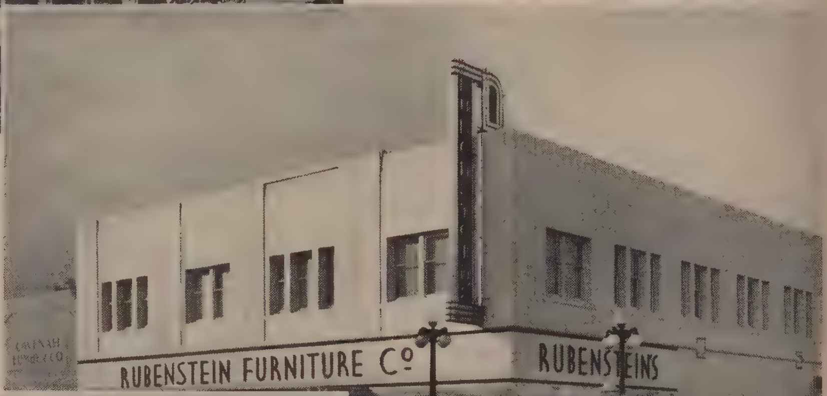
BARKER BROS. ANNEX
LOS ANGELES, CALIF.
WARREN DEDRICK
ARCHITECT

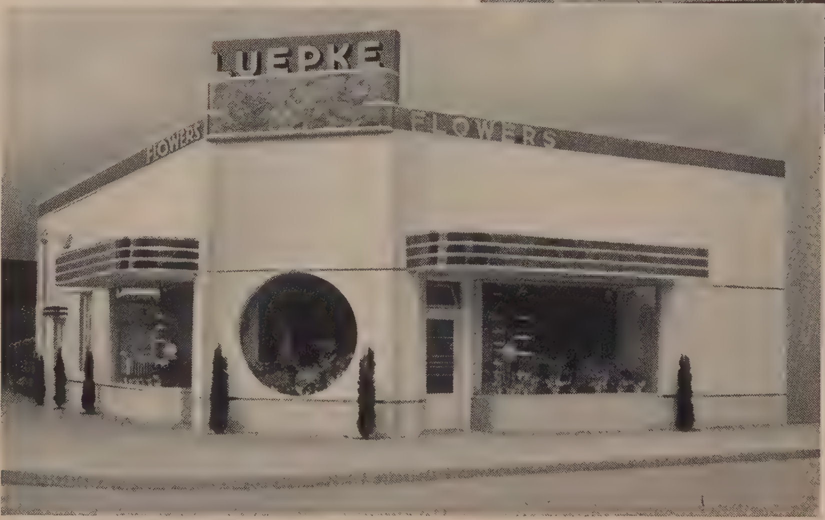




STORE-WILSHIRE BLVD. &
SERRANO ST.-LOS ANGELES
N.W. CHURCH & K.J. FLINT OWNERS
MORGAN, WALLS & CLEMENTS
ARCHITECT

RUBENSTEIN FURNITURE CO.
EUGENE, OREGON
HARRY HERZOG
ARCHITECT
PORTLAND, OREGON





LUEPKE FLOWERS
13TH & WASHINGTON STS.
VANCOUVER, WASHINGTON
DONALD J. STEWART
ARCHITECT

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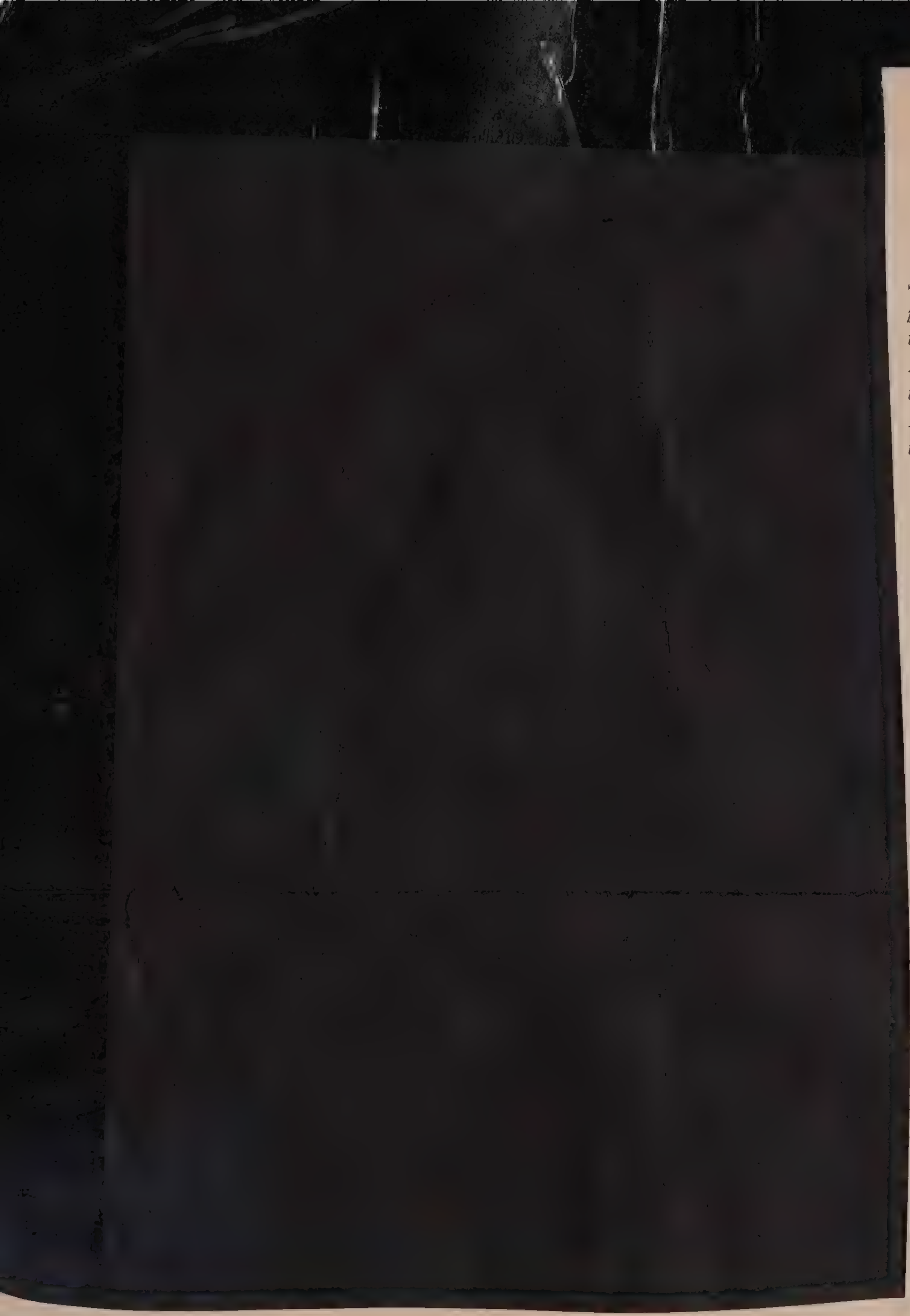

The only purely architectural detail of Spreckels Sugar Company's fine new plant at Woodland, Calif., is confined to the administration building. Harry A. Thomsen, Jr., architect, successor to George W. Kelham, San Francisco. Dinwiddie Construction Co., contractor.

Spreckels Sugar—Plant No. 3

By Harry A. Thomsen, Jr., Architect*

THE processing of sugar from beet roots to white crystals is one of the most precise and exacting of industrial operations. Each step of the way—slicing, filtering, evaporating and finally drawing the molasses from the sugar crystals—requires a series of tanks and machines so integrated that the process can continue day and night without interruption during the annual sugar "campaigns".

Because it is a great functional engineering unit, the plotting and layout of a sugar plant is no part of an architect's business. But a sugar plant can be, as other types of industry have found, an efficient array of machinery enclosed and sheltered in a pleasing structure. And that is where the architect, in recent years, has become increasingly important to industrial planning.

To process the great tonnage of sugar beets now produced in the Sacramento Valley, the Spreckels Sugar Company, pioneers in the development of beet sugar in America, has recently completed the most modern sugar factory in the world. Located at Woodland, California, near a great coast highway, Plant No. 3 gleams clean and white—a great symbolic sugar loaf against the green of the beet fields that surround it.

Spreckels' competent engineers designed the plant and

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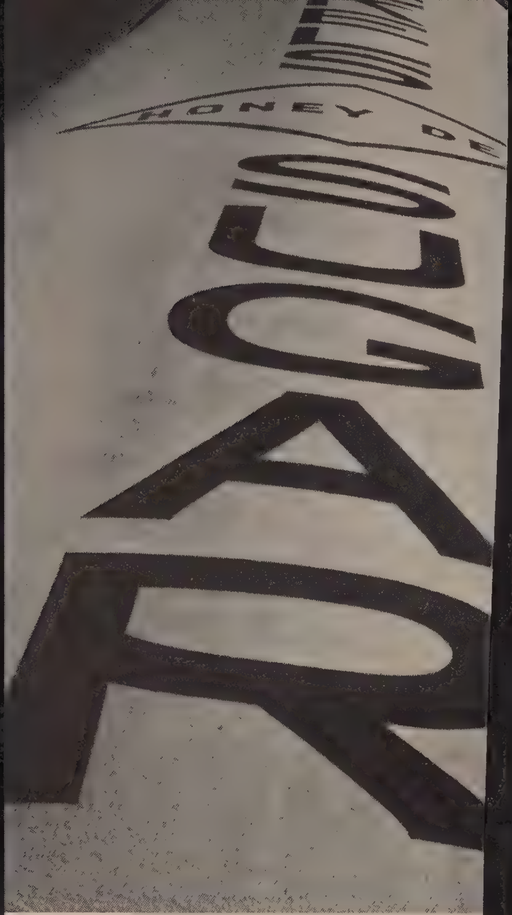
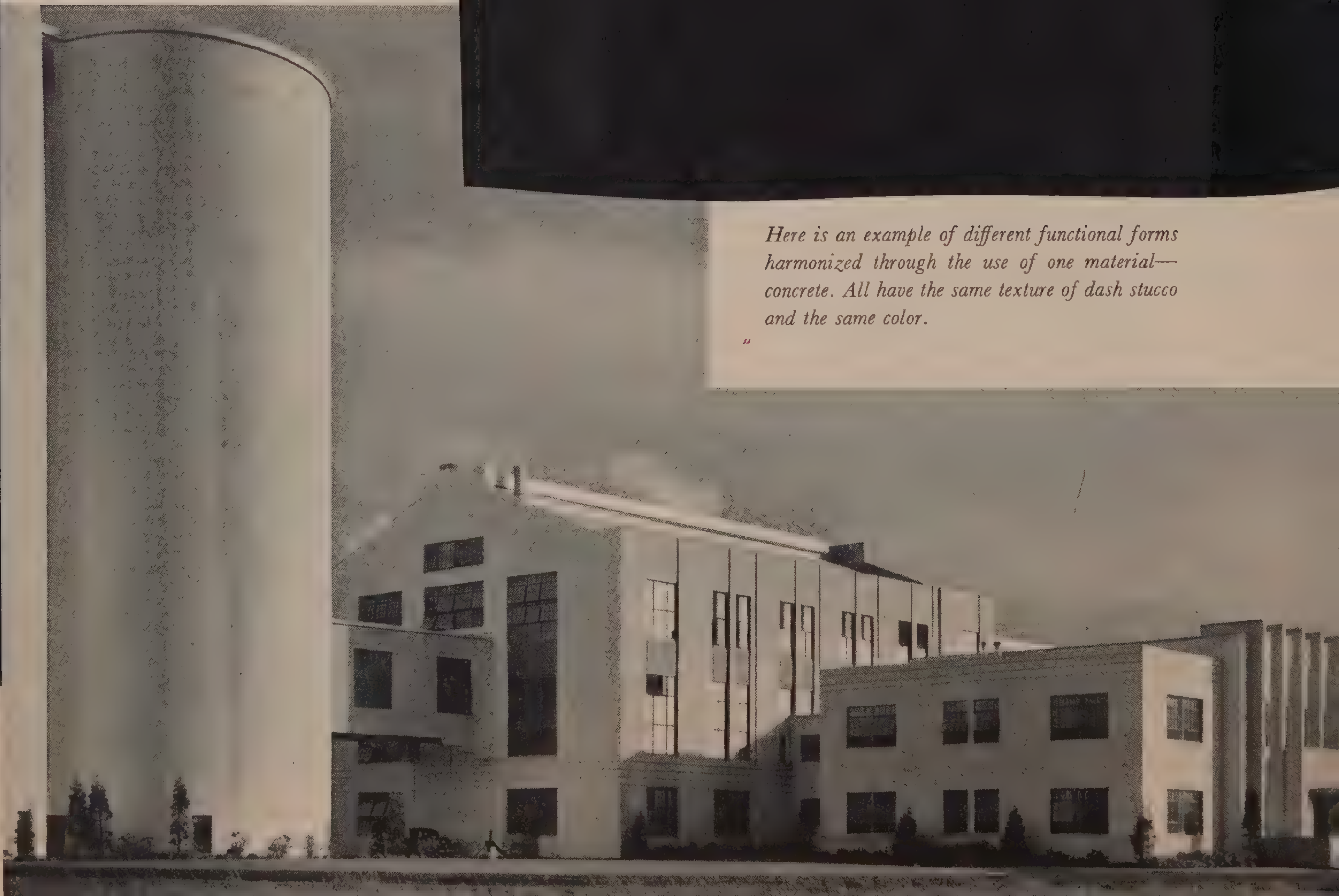
*Successor to Geo. W. Kelham, Architect, San Francisco.



A battery of five storage bins dominates
layout. Their material, color and text
the rest of the buildings with which the



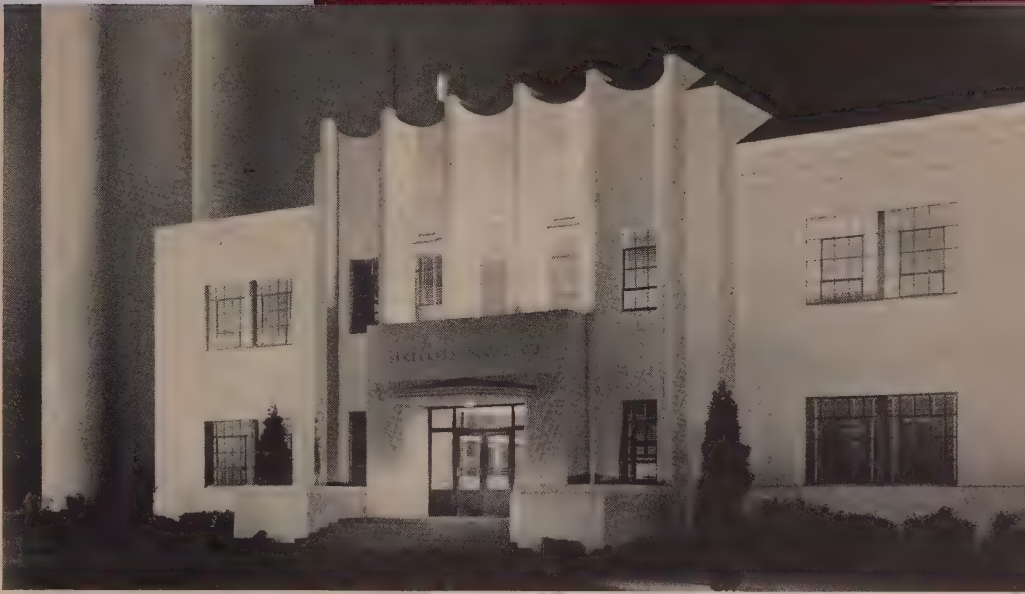
Here is an example of different functional forms harmonized through the use of one material—concrete. All have the same texture of dash stucco and the same color.

with milled wood employed only for shallow reveals and rustication lines. The final finish of the building was a stucco spatter dash in a buff shade which heightened the character of the walls and made all surfaces generally uniform in texture.

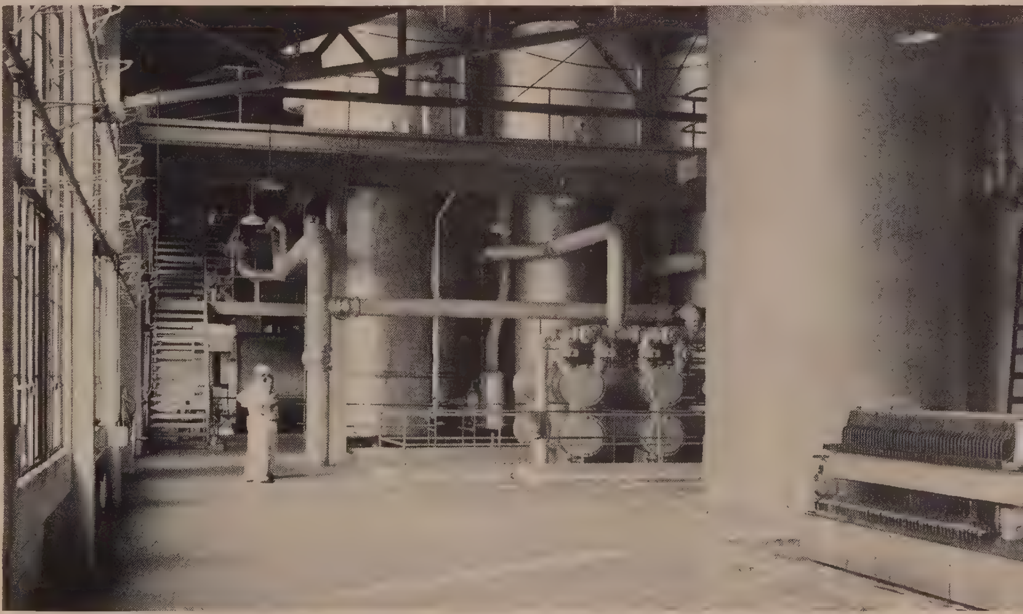
The building was completed August 1, 1937, in time for the fall sugar campaign. Immediately after opening, the plant went into full operation with day and night shifts, for during the sugar campaign tons of beets arrive daily and must be put into process as rapidly as possible.

In completing the Spreckels building superstructure, the work of the architect was not entirely finished, for he was asked to advise on interior color treatment, planting and night lighting. The use of aluminum paint on many of the large tanks inside was suggested to protect the equipment, to reflect light and to provide a pleasing, cheerful interior effect. The floodlights, some white and some amber, emphasize the architectural features and give the structure advertising value at night.

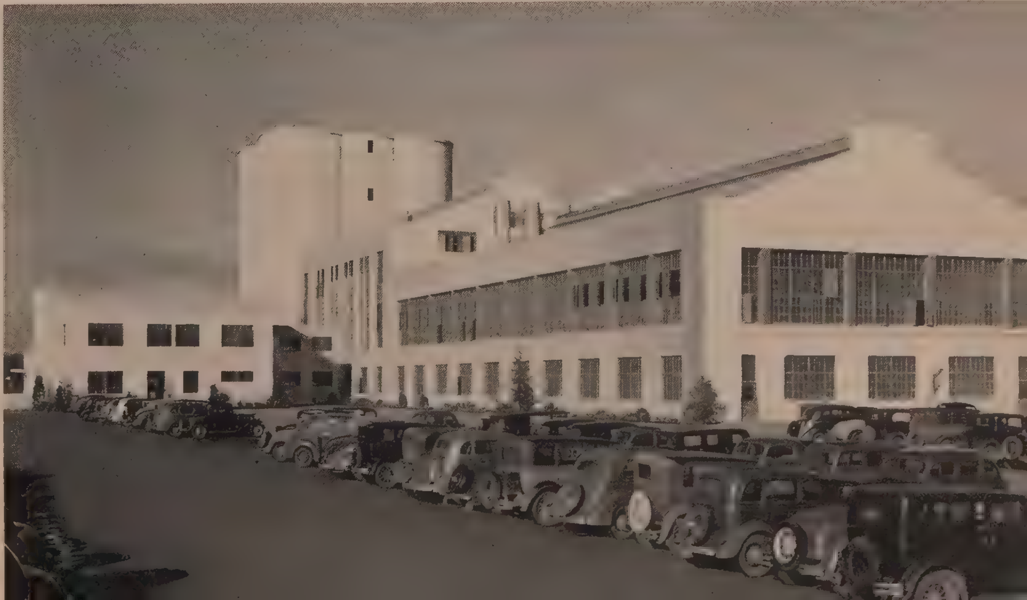
Architectural work on the project was started by the late George W. Kelham, architect, of San Francisco, and completed by the writer. Dinwiddie Construction Co., of San Francisco, was the general contractor.



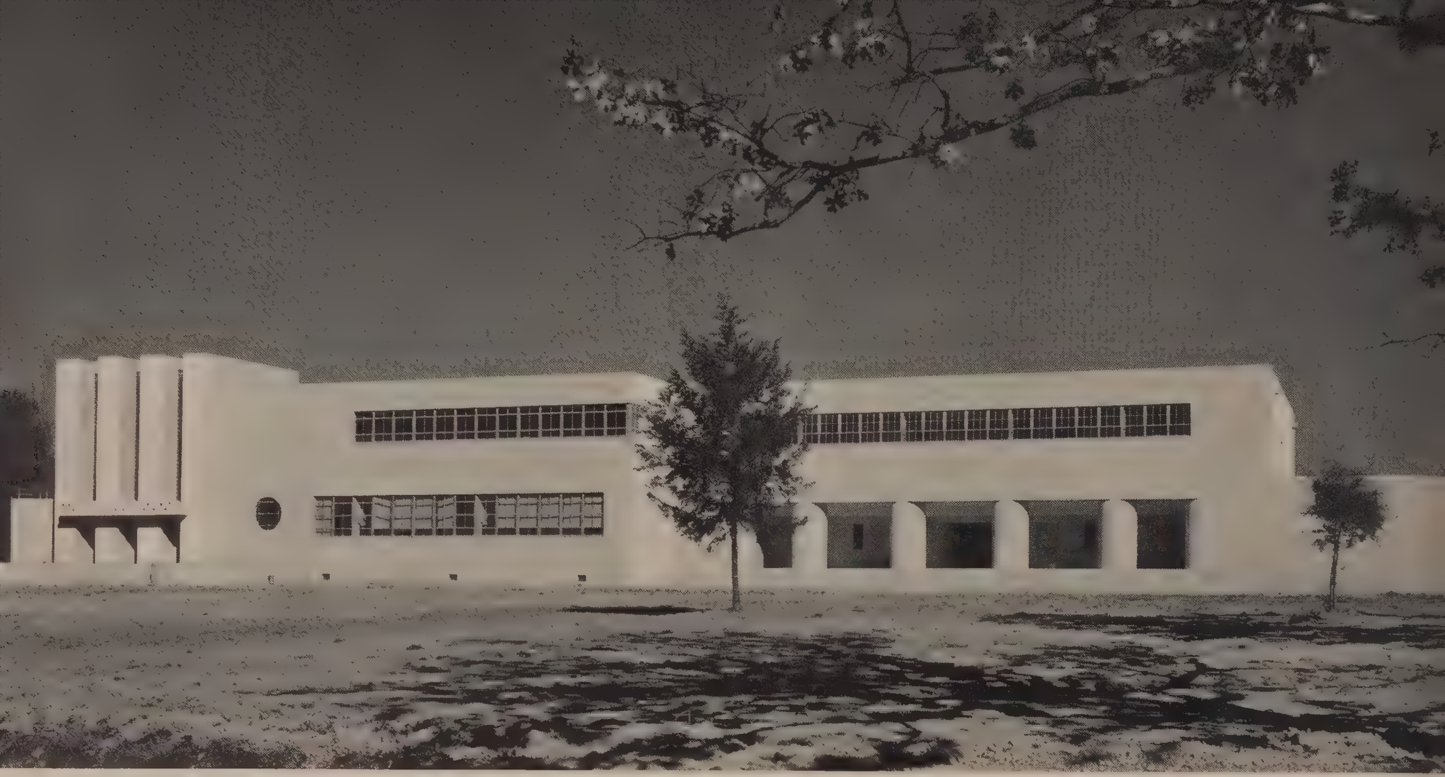
At night the building is floodlighted. White lights are cast against most of the structure with amber light accenting the fins over the entranceway.



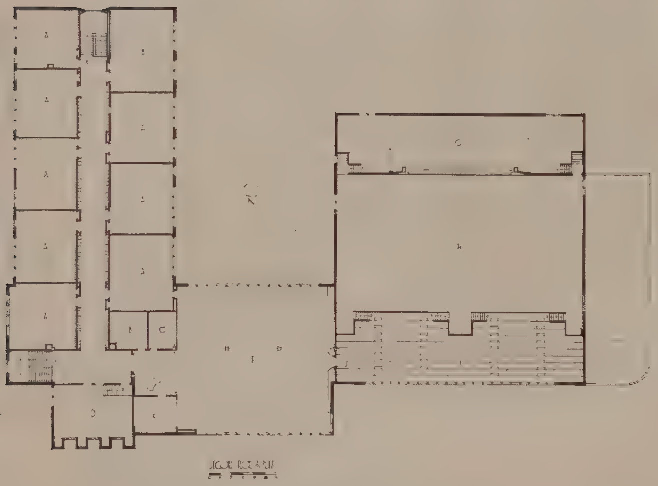
Clean concrete floors and aluminum-painted tanks and machines give the inside of Spreckels Sugar Plant an appearance of cleanliness that is impressive to hundreds of visitors.

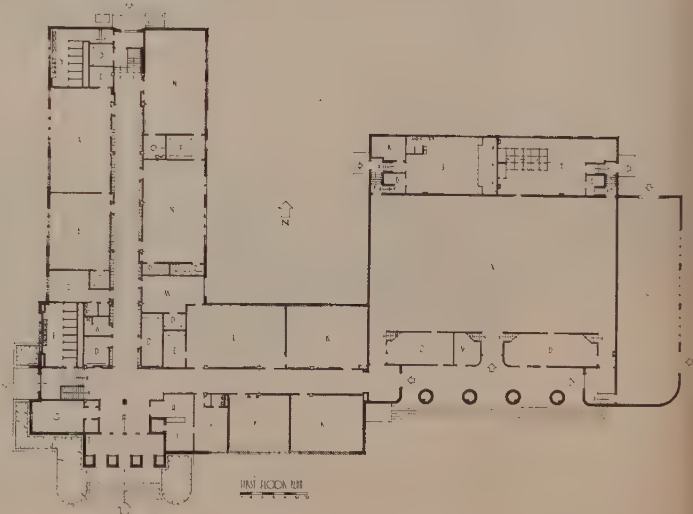


Called the "most modern sugar plant in the world," the structure was built and equipped at a cost of $2,500,000. It was completed in 1937 in time for the fall sugar campaign after less than a year devoted to construction.

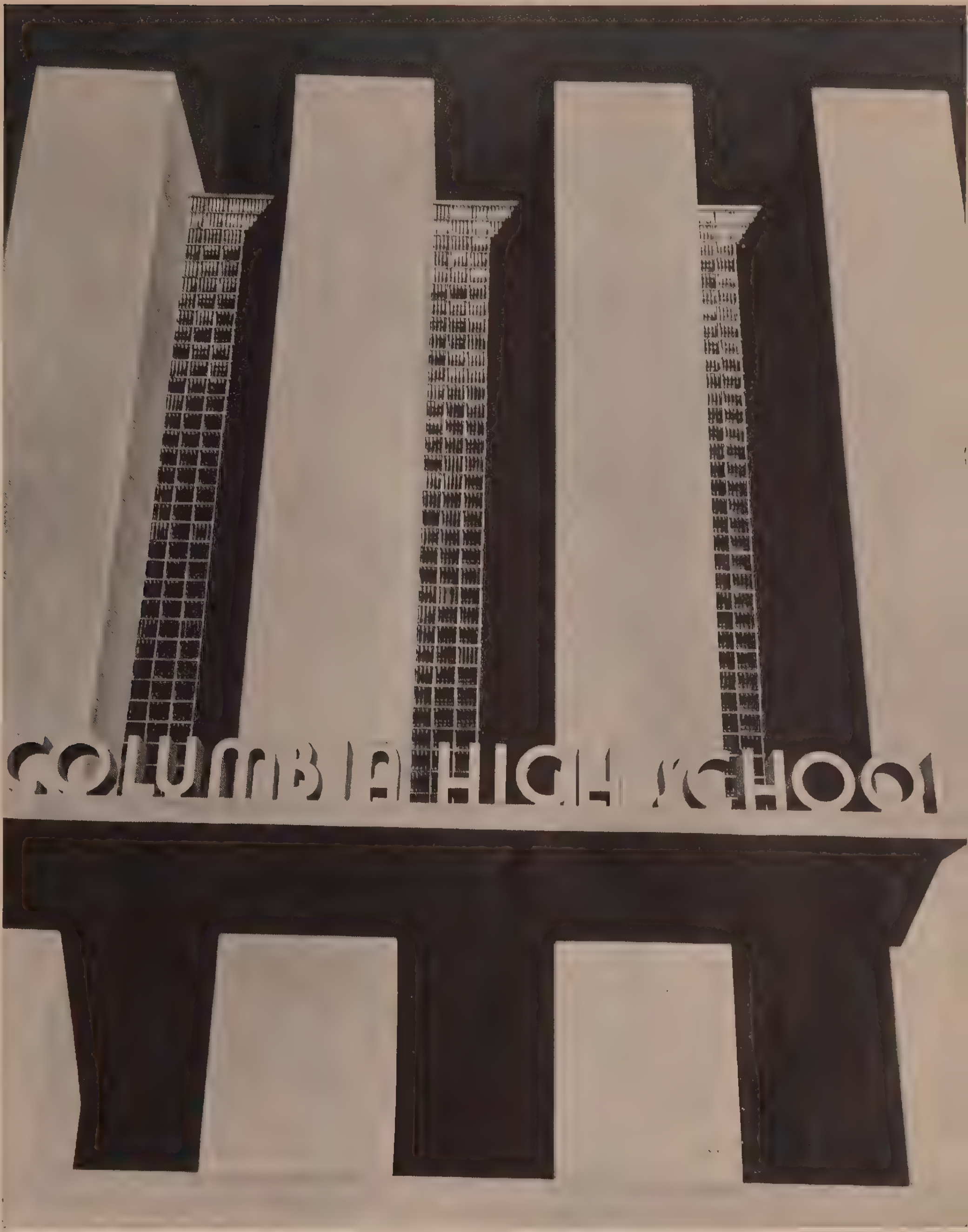


Notable success in the use of architectural concrete for modern forms encouraged the architects to go "all the way" in their design of this fine southern high school. A unique feature of the plan is the combination of the auditorium and gymnasium to be utilized for either function.





COLUMBIA HIGH SCHOOL
Columbia, Miss.
N. W. Overstreet & A. H. Town, Architects
Dye & Mullings, Contractors



A refreshingly different entranceway is comprised of four concrete pylons divided by vertical areas of glass brick. The name of the school is in cast stone letters, set on a cantilevered canopy.

Design for Space Economy

By A. Hays Town*

As an architectural firm we have felt for some time, and stated openly, that the "time-honored" styles of architecture are soon going to be forgotten and that the more functional designs and simplicity required by more and more economical building budgets will tend to create a new and definite style.

This could be reason enough for Columbia High School, recently completed at Columbia, Mississippi. But it is not the only reason why an ultra-modern form was chosen and executed. We were designing with concrete in mind, and the material itself suggested many departures in style. Furthermore, the Board of Trustees of the Columbia Municipal Separate School District were more in favor of the style adopted than any of the others presented. Because we have had pleasant success with other modern designs in concrete, we felt no hesitation in proceeding on the Columbia School project in the form in which it now stands.

The stride from the conservative-modern to the ultramodern, which is reflected in our work during the past three years, has been met with much interest and expressed pleasure in the community in which this school is located. And the best test of style in these transitiona days is to be found in acceptance rather than academic consideration.

Several important requirements have apparently been satisfied in the design and construction of Columbia School:

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*N. W. Overstreet and A. H. Town, Architects.

the need for ample space—1,143,833 cu. ft.; a reasonable expenditure—$131,363; and flexibility in the use of the building for many purposes.

The combination gymnasium-auditorium wing was made separate and prominent because the school building serves also as a community center. For this reason the wing has a separate entrance and may be closed off from the classroom block. Social functions and athletic events are largely patronized by communities in this section of the country, hence this provision for community use is typical of a great many of the newer school buildings.

The gymnasium-auditorium section of the structure is located near the corner of the plan to give free access to traffic and parking facilities. An unusual arrangement of the plan of this building to get maximum use of the space is the location of a completely-equipped gymnasium between the auditorium and the stage. This provides permanent seating for athletic events. However, by placing seats on the gymnasium floor, the entire space may be changed over into an auditorium.

Another example of economical use of the space is the library, located on the second floor to take advantage of north lighting. The library is used as a study hall and will accommodate a large number of students throughout the day during periods when they are not in recitation classes.

The dominant architectural feature of the building is the entrance, located at ground-floor level. It is monumental in effect, but is really a simple arrangement of four pilasters separated by glass brick. It provides a strong vertical contrast to the horizontal movement of the rest of the building, a factor considered necessary in balancing the front facade. In keeping with the simplicity of line and mass, the name of the school is in cast stone letters resting on the canopy over the three doorways.

Fenestration throughout the building is purely functional, intended to provide for maximum daylight. The use of continuous bands of windows on the front facade, however, has the decorative effect of systematically relieving the plain wall areas. The horizontal emphasis created by the three bands of windows is balanced by the colonnade of four massive piers which forms the porch of the right wing.

Behind the main facade the student activity rooms on the second floor are illuminated by tall vertical windows.

Aside from the details noted above, the building is as simple as it is possible to execute in architectural concrete. The walls were formed against plywood panels to produce a smooth texture. Then all wall surfaces were rubbed to a final finish. The result, as the photographs reveal, is a light-colored mass accented by deep reveals and ordered openings. It is precisely what the architects desired, and the building has proved highly satisfactory to the school officials who observed the work from the beginning with great interest.

Credit for the fine execution of the design in concrete must be given to Dye & Mullings, general contractors of Columbia.

In design and construction Columbia High School, like the Edward L. Bailey Junior High School at Jackson, Mississippi, completed last year, provided splendid opportunities for the study of educational planning and the use of concrete as a first-class architectural medium.

Massive pillars form a colonnade at the porch opening into the gymnasium and auditorium.

Edison Tower, Menlo Park, N. J., is a reinforced concrete shaft formed against exposed aggregate cast stone slabs which were used as forms. The tower, surmounted by a Pyrex glass globe in the shape of the first incandescent lamp, is located on the exact spot where Edison produced the first electric lamp. Massena and DuPont, architects; John J. Earley, architectural sculptor; Louis A. Doane, consulting engineer; Walter Kidde Constructors, Inc., contractor.

The Edison Tower

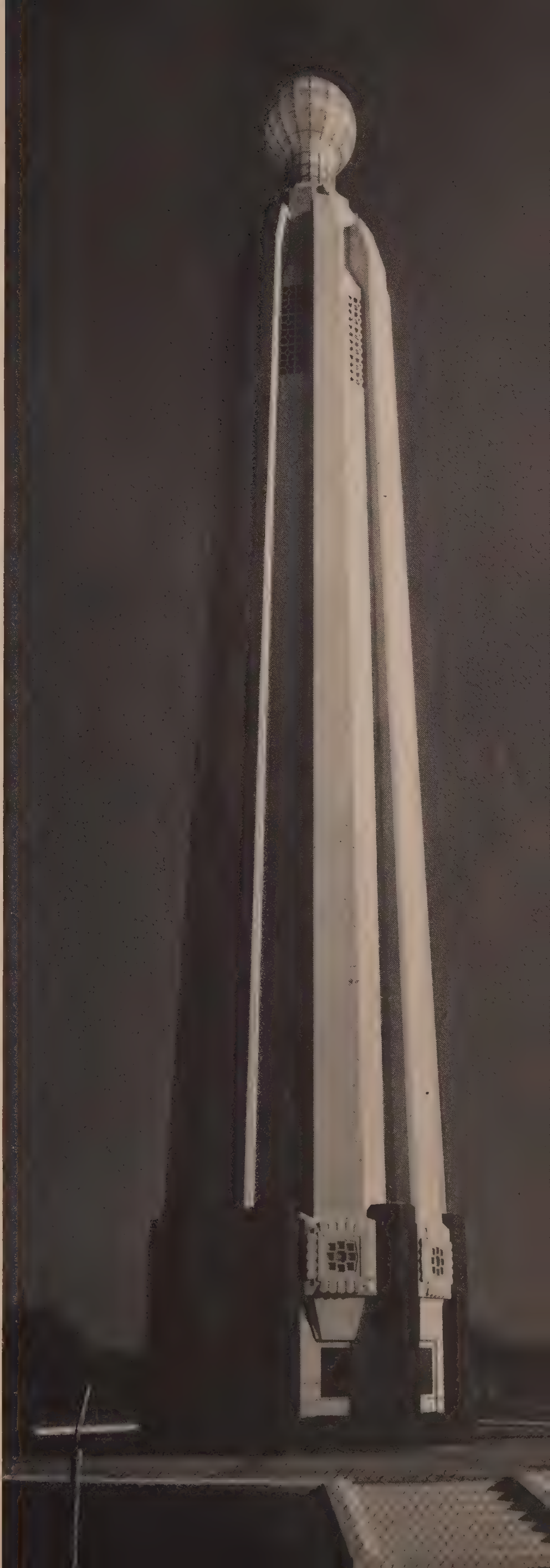
By Gabriel Massena, A. I. A.

THE Edison Tower, recently completed at Menlo Park, New York, was erected over the exact location of the shop in which the first practical incandescent electric bulb was produced by Thomas Alva Edison on October 21, 1879. A gift of William Slocum Barstow to the Thomas Alva Edison Foundation, Inc., in behalf of the Edison Pioneers, it replaces the steel tower erected on the site in 1929.

Several requirements were to be satisfied in the design of the new tower, chief of which was that the old steel tower surmounted by a steel framework in the shape of a giant bulb lighted by 960 incandescent lamps, was to be conserved during the construction of the new concrete structure. This limited the dimensions of the monument in height and determined the width of the base.

An octagonal reinforced concrete shaft, the tower is 118 ft. high and 24 ft. across the base at terrace level, tapering to 10 ft. at the top.

These fixed dimensions were rather troublesome at the start in the study of the masses of the monument. That difficulty was solved, however, in a manner that made possible a lighting scheme different from the general flood-



lighting at first considered—and certainly more effective.

Another requirement was the retention of the giant bulb at the top as the main feature of the design. Since the combination of the existing steel-ribbed bulb with the concrete shaft was difficult from an esthetic point of view, it was finally agreed that a new bulb should be made of cast Pyrex elements and mounted on an interior steel frame. From the ground this frame is invisible.

To make the bulb appear an integral part of the monument, to obtain more scale and dignity, the treatment of the two materials—glass and concrete—was studied so as to make them blend together as much as possible.

The choice of concrete as the material for expressing the design of the monument was determined because it afforded the best facilities for building around the steel tower, and also because it was appropriate in view of the many improvements in the manufacture of portland cement contributed by the inventive genius of Mr. Edison. The natural grey color of the material, however, was considered inappropriate, hence the problem was solved by using precast concrete facing units whose aggregates, mostly quartz, were carefully selected to make possible a gradation in color from buff at the base to white at the top where it blends with the Pyrex bulb.

By brushing off the outer coating of cement before hardening, the quartz aggregates are exposed, giving a glittering appearance to the tower which successfully eulogizes Mr. Edison's most popular invention—the incandescent lamp. These precast units were executed by John J. Earley, whose intense interest in exposed aggregate concrete and craftsmanship are well known to the readers of this magazine.

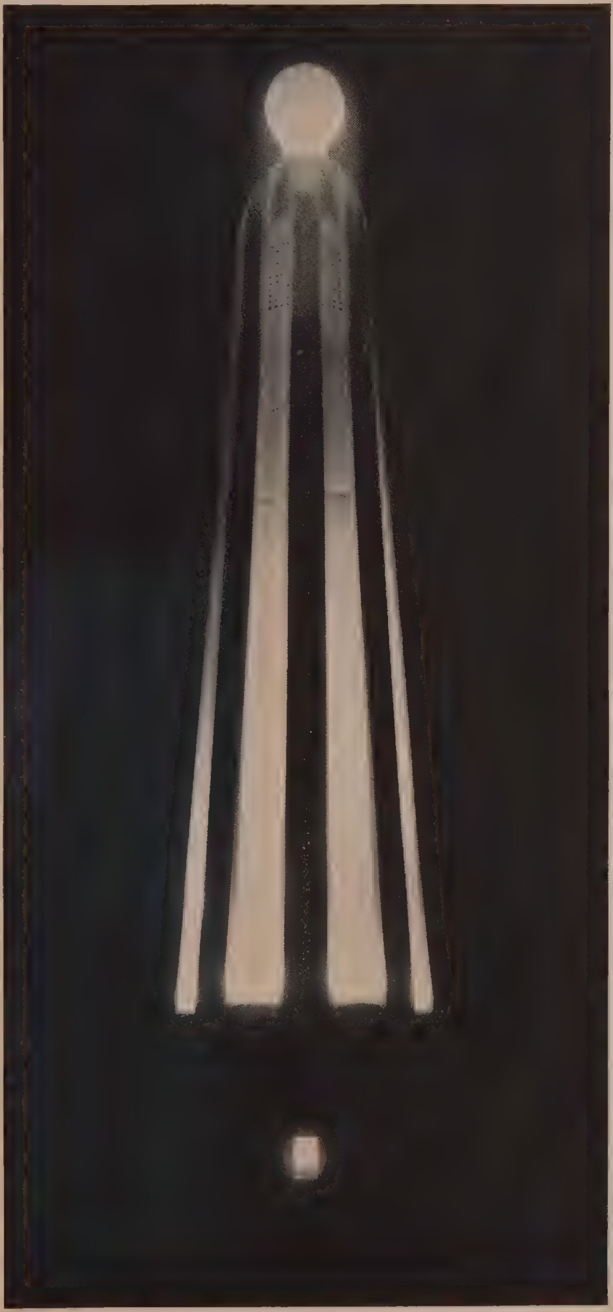
An interesting, but no longer new feature of the construction, was the use of these 2½-in.-thick precast slabs, which were molded in panels 10 ft. long, as the outer forms for a 10-in. reinforced concrete tower wall. Perfectly anchored to the reinforced concrete by means of loops of ⅜-in. round rods molded into the slabs, the facing and structural wall become an integral unit. The facing must be considered an integral part of the structure since it has a practical function and is not applied for the purpose of giving a false impression of richness, as is often the case with the use of strictly facing materials.

Located in the tops of the base columns are lamps which illuminate the tower at night. The light is thrown between the buttresses, producing alternate bands of light and dark.

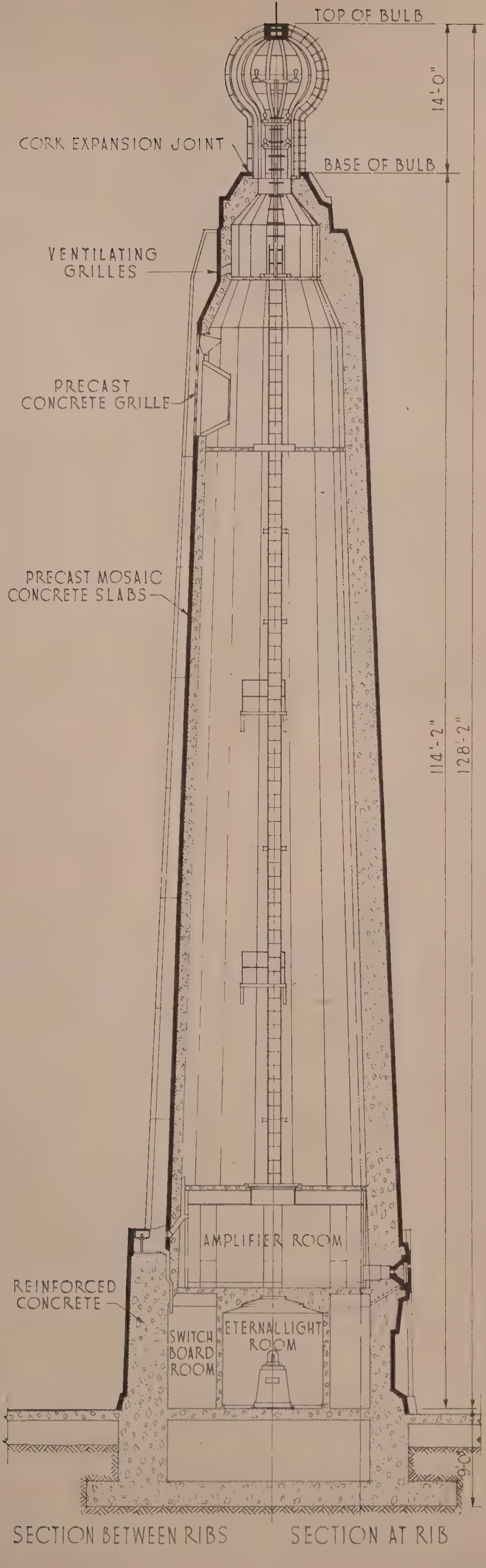
The same line of reasoning used in the choice and refinement of materials was followed in the design of the masses. Eight buttresses rising from the ground up to the bulb emphasize its dominant importance and cast shadows in the recesses between. At night they stand dark, framing the beams of the floodlights located in the tops of eight columns arranged at the base of the shaft. This strong contrast emphasizes the value of light and the height of the tower.

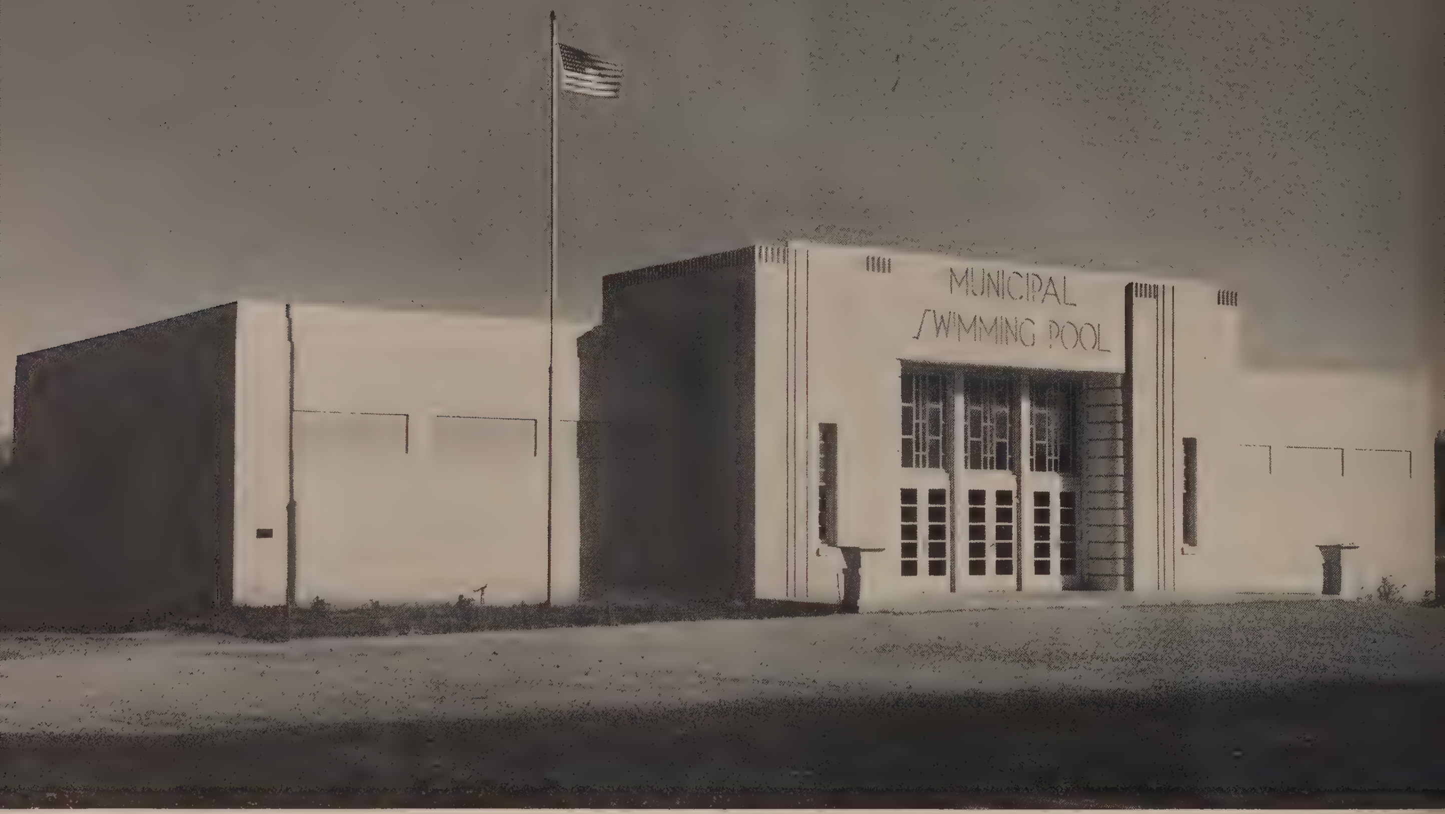
Illumination of the great bulb remains the main feature of the scheme, and it certainly would have been less impressive if every inch of the monument had been floodlighted as was first considered. The idea of contrast is expressed in daytime by the use of precast units with exposed black ceramic aggregates for the eight base columns which frame the bronze tablets describing Mr. Edison's work at Menlo Park. The motif above each tablet was originally intended to portray in bas-relief or mosaic one of the major inventions. However, these symbolic features were replaced by loudspeakers, and another group of loudspeakers are located behind the cast concrete "claustra" near the top of the tower.

From a glass panel on the bronze door, a replica of the first incandescent electric lamp made by Mr. Edison can be seen in the Eternal Light Room which occupies most of the ground level of the interior of the shaft.



Fully illuminated, the tower can be seen for miles at night. It replaces a steel tower erected in 1929.





Just what the architect ordered—is the Dubuque, Iowa, bath house, a concrete structure which also satisfied rigid requirements for long life and low cost. C. I. Krajewski was the architect. It was built by WPA labor.

Elegant—as Anticipated

By C. I. Krajewski, A. I. A.

PROBABLY nothing in the world gives an architect more satisfaction than to have a finished job look exactly as it was pictured in his mind.

Dubuque's new Municipal Bath House has done this perhaps better than any project turned out by our office. There were times during construction (freshly-stripped concrete is hardly a thing of beauty) when we wondered what our final answer would be. As the job went up, we foolishly expected each successive placement of concrete to be a complete, attractive unit. Except in a strictly utilitarian sense, they definitely were not. But—when the last concrete was placed and the walls cleaned down and the rough spots dressed up, the last of our fears was banished. Here was a job that looked exactly as we had pictured it.

Before designing this building, several definite questions had to be answered. Each in itself was not of much importance, but grouped together they were of great importance, and they all pointed to one final solution—architectural concrete. Some of these considerations are worthy of mention.

First of all, the building was to be occupied but three or four months of the year. We must, therefore, select a material that was practically indestructible, both from the standpoint of fire and vandalism. Next, it was to be built on questionable foundation material. We must have a material that would offer maximum resistance to uneven settlement if it should occur. Next, the job was to be built as a WPA project; it must, therefore, be of a material that would require a minimum of expenditure for skilled labor. For the same reason it must be as simple to build as possible—yet still be attractive. And last, but never the least, the sponsors' share of the cost must be as low as possible.

Each requirement in turn pointed to concrete. This material is as nearly indestructible as any known; it requires a minimum of skilled labor; cast as an integral mass, the building would act as a unit in resisting any stresses due to uneven foundation settlement; the building could be designed for easy construction and still be attractive. With the materials and equipment at hand for the construction of the pool itself, it would be possible to keep the city's share of the cost at a minimum.

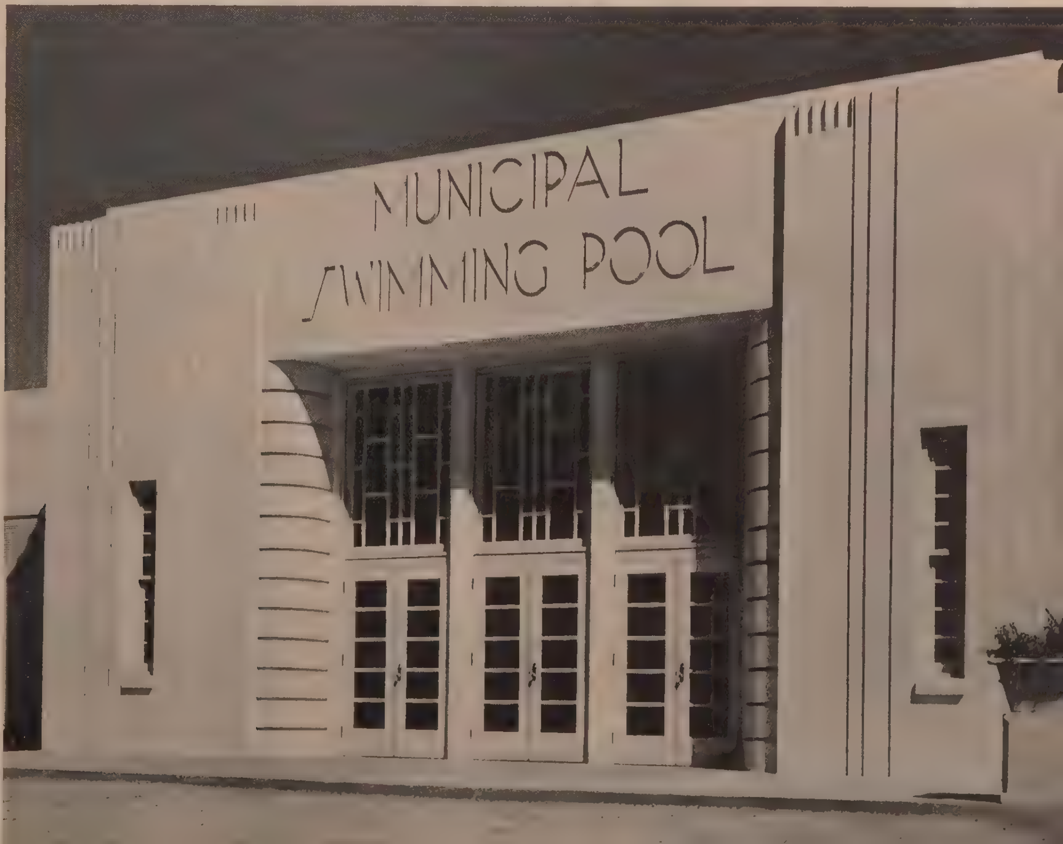
Laying out the bath house was no particular problem. The filtering and mechanical equipment is located in the basement, and the main floor plan has the checkroom in the center section with dressing rooms in the two wings. Originally the plan called for a roof over the entire structure. While the project was under construction, however, it was decided that it would be better to omit the roof over the dressing room wings to permit sunlight and ample ventilation aid in keeping them dry and sanitary.

The original design also called for ventilation louvres in these dressing rooms. Leaving off the roof eliminated their need for ventilation purposes, but to leave them out would change the appearance of the building. To retain the original architectural effect, sections of corrugated metal were built into the forms in the spaces allotted to the louvres, giving shadowed panels in the finished concrete and the desired appearance.

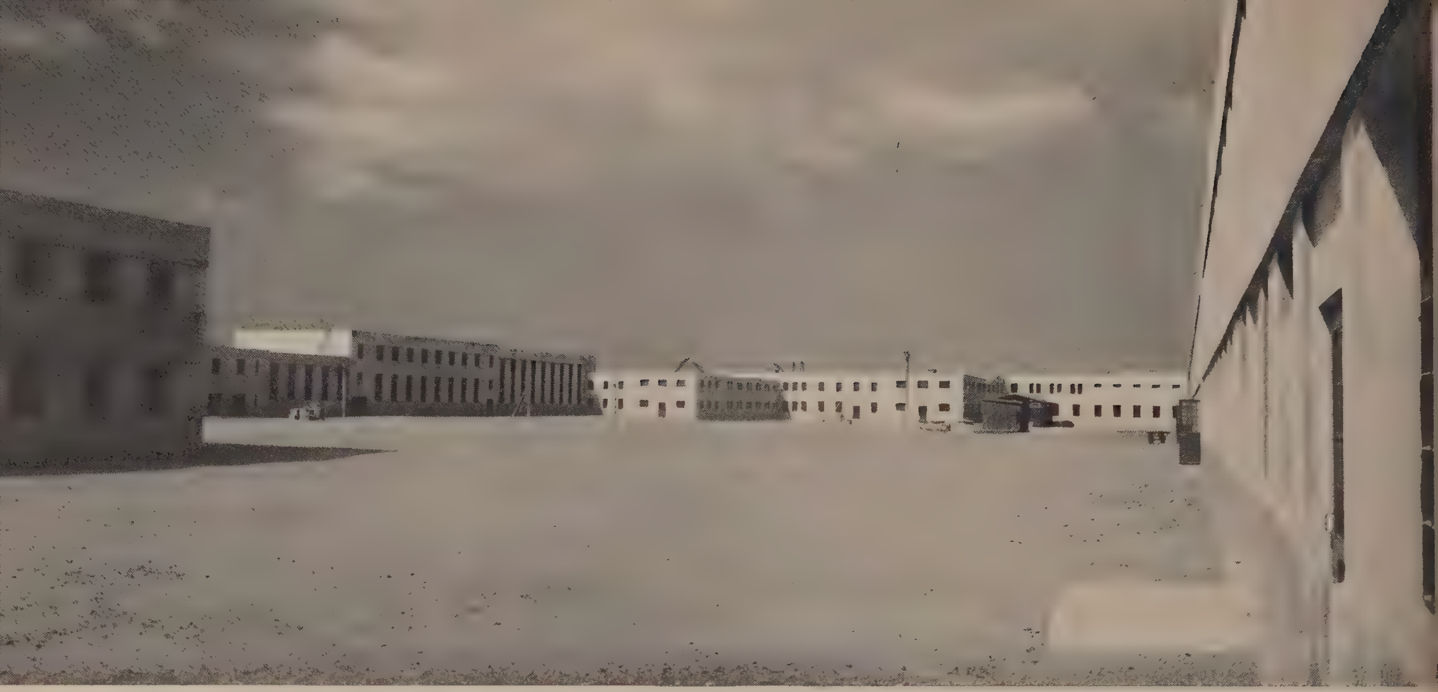
The lines and masses of the exterior were so arranged that comparatively rough forms of horizontal sheathing would add to, rather than detract from, the appearance of the building. This was fortunate, for the 1x6 forming material, after being reused several times in the construction of the pool, took on a rather permanent curl. Consequently, when it was used again on the bath house, it produced very definite horizontal markings in the concrete walls.

This rough texture is particularly effective at the entranceway. The clean-cut vertical pilaster offsets the smooth metal-formed circular return fillets on either side of the door proper, and the cleanly-incised lettering over the door all contrasts definitely and pleasantly with the rough horizontal markings.

A finish touch was a coat of paint made of white cement and comparatively coarse sand (between a 50 and 30-mesh). Using the coarse sand tended to take away the sharp lines of the horizontal markings, and to soften the color from a dazzling white to more of an old ivory shade. All in all, the now-finished project is quite satisfactory. It fitted well into the WPA program, it pleased the sponsors because their original costs were cut to a minimum and their maintenance costs are expected to be negligible. And we like it because it looks just as we pictured it originally.



The vigorous texture of the walls was produced by using rough form lumber that had become curled and slightly warped through repeated use. The finish was a coat of paint made of white cement and coarse sand.



Inside the quadrangle of the newest Federal Jail, located on Terminal Island in Los Angeles Harbor. All the twelve structures are reinforced concrete formed against plywood panels. Designed jointly by the Department of Justice and Treasury Department engineers and architects, it was built by the R. E. McKee Company, general contractor. Graham Brothers, Inc., was subcontractor for the concrete work.

Newest Federal Jail

By Frank E. Ross, Engineer*

THE government has designed its newest jail, a rambling and jointed, fortress-like concrete structure, quite fittingly to the man-made sand flats of Reservation Point, Terminal Island in Los Angeles Harbor. The low, broad features of the squarely-molded buildings portray strength and solemn warning to the visitor. They seem to say: "Pay your income tax and do what's right by your Uncle Sam—or else!" Just completed, the ensemble has already become a part of the landscape. It seems to have sprung up overnight from the surrounding acres of gray sands.

Twelve different structures serving all the functions of a jail community form the huge quadrangle. The Administration Building houses the hospital section, guards' quarters, offices and a few quarantine cells. Three cell blocks are designated as Quarantine Block, Outside Block and Inside Block. The first two have two floors of cells similar in design, while the Inside Block has three double tiers of cells, differing in type from the others. The Women's Building has cells on both floors and includes kitchen, dining hall, work shops and recreation rooms.

The project is complete and self-contained, having its own cold storage and ice plant, power house, kitchen and baking building, shops, laundry and repair sections. The auditorium is fitted with a spacious stage and a modern moving picture projection room, while on the second floor of the building is a library and several classrooms.

As on the outside, so in the interior, one sees concrete and more concrete—pleasing to the eye in its smooth finish and straight, true lines—yet monotonous in its magnitude and similarity. The rugged, unfinished construction maintained throughout the interior, excepting the hospital and administrative sections, inform one that the first and prime consideration in the design is for structural stability, built for a stern purpose.

Due to the War Department's excellent job of island making, these sands are considered sufficiently stable and compact to offer suitable bearing for building foundations. Piles were driven for the building along the revetment of the east side only as a precautionary measure against heavy seas topping the rock barrier. Conditions were highly advantageous for excavation. The sand holds sufficient quantities of silt and shell to maintain its banks, yet it was quite necessary to build forms for all wall and column footings.

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Soon after the contractor received orders to proceed, a large dragline power excavator had mountains of sand piled around the footing boundaries. Concrete operations started October 2, 1936, on the footings at the east end of the Administration Building and progressed rapidly from one unit to another, traveling around the quadrangle until the roof slab of the last building was completed June 5, 1937. A high, heavily-buttressed wall between the south dormitory and the power house completed the enclosure. Additions to the contract included a sally port, which was placed at a later date. Guards' walks and towers and two additional service buildings will complete the project.

Before wall concreting started, it was found the contractor's construction superintendent agreed fully with the government engineer on important items of placement. In walls of this design, where the product must be satisfactory architecturally as well as hard, dense and durable structurally as it comes from the forms, our best results previously had been obtained by using long, narrow stick-spades to work the concrete through the two curtains of steel and into all corners. Following this procedure, from four to six spade men were placed in each receiving group, compacting and working the concrete as each buggy was dumped. Three groups of workmen, with a foreman in charge, usually comprised the placing crew. A shovel man, the unofficial captain of each group, received and directed the dumping of each buggy as his crew advanced around the wall. Each shovel man had his crew of spaders on top and his mallet men tapping studding below, the spading and tapping going on simultaneously. To this method of placing is given the major credit for the very pleasing and satisfactory results obtained. There was a minimum of honeycombing, and edges at form corners were clean-cut and sharp. Air bubbles were not excessive and only slight filling and rubbing was necessary to finish the surfaces.

Plywood form lumber was used and reused, and as the work progressed it became necessary to use grinders to remove surface burrs and rod-hole blemishes. Form plaster was used to fill joints between abutting sheets of plywood, thereby avoiding conspicuous joint lines.

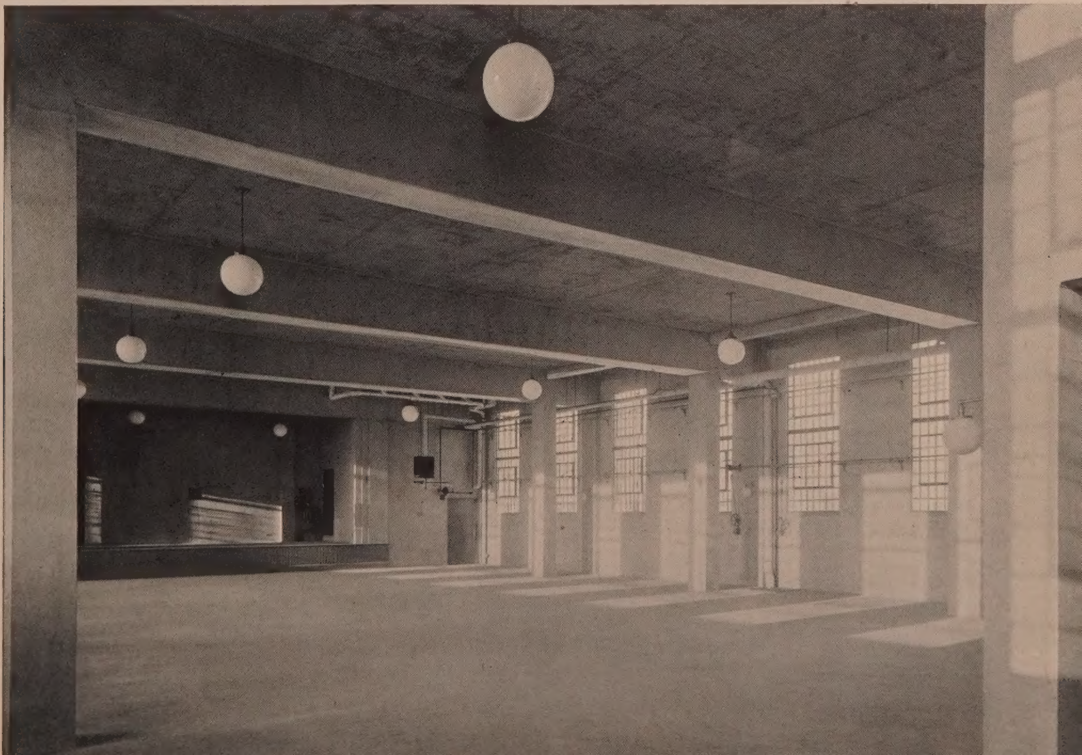
Internal vibrators were used experimentally, but because of the large amount of reinforcing steel they could not keep pace with the placing crews and were discarded. A stiff but well-designed and workable mix was easily placed by hand spading.

Well-graded aggregates, graded up to the maximum size specified, were used rather than a small or intermediate size. By using the largest practicable size aggregate and a fairly rich mix, less sand was required than in a mix with the ¾-in. maximum size aggregate often used on similar work. Staying with the established mix consistently, with only slight variations in aggregate when changing from walls to slabs, gave desired results in architectural lines as well as strength, hardness and density.

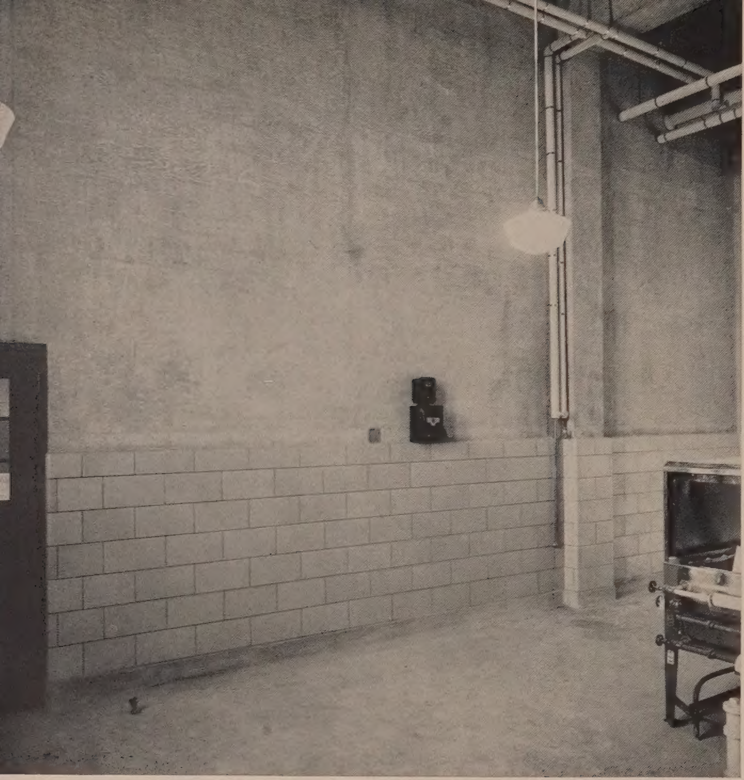
Water gauge and scale settings were changed frequently due to arrival of fresh supplies of aggregates, the sand and gravel varying somewhat in free moisture content. Scale adjustments were also made when fine and coarse aggregate proportions were changed in meeting various placing conditions. Many times the hopper tenders at the plant wondered just what caused the inspector to change his mind so many times.

From a central mixing plant, transit-mix trucks of 4-yd. and 5-yd. capacity delivered concrete to the hoisting towers. Daily runs reached a maximum of 360 cu. yd.

Various ideas relative to concrete work were developed



A small auditorium in one of the buildings. There is no interior finish in any of the buildings except in the hospital and administration sections.



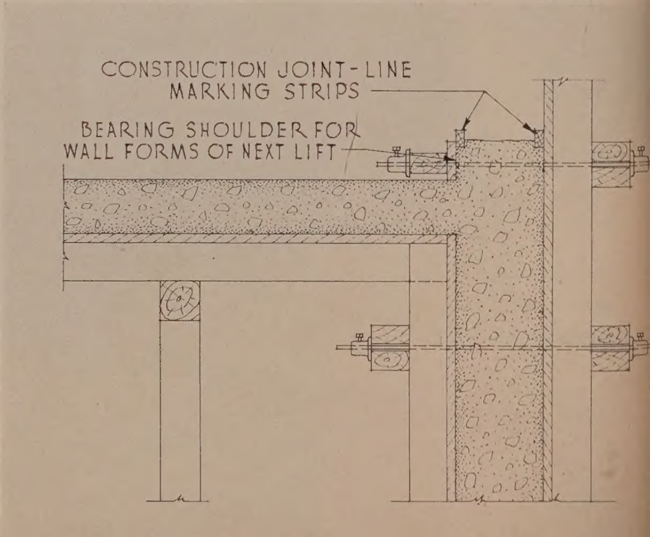
How well the concrete was controlled and handled is indicated by the appearance of this kitchen wall which shows the grain marks of the plywood form panels.

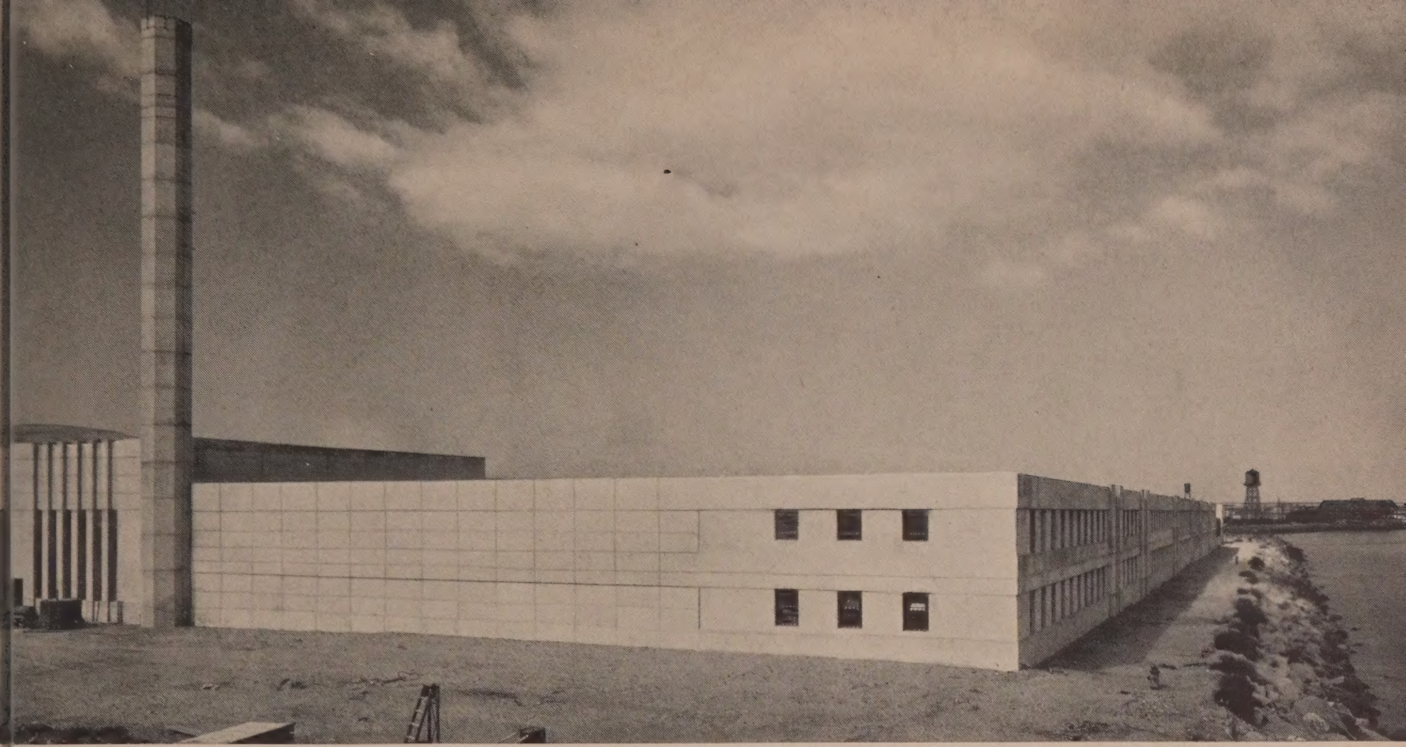
and put into use during construction progress. In an effort to produce clean, tight and straight horizontal construction joints, a narrow screed strip was nailed at the top of the inner and outer panels of wall forms. The concrete was then placed full and allowed to go somewhat above the underside of this marker strip. As the concrete hardened, this strip was removed and there resulted a true, even and clean line to receive the next lift of concrete. Cleaning out the forms at joint lines is also of great importance. Compressed air was used effectively for this purpose. A light portable compressor outfit equipped with a long hose with a length of small tubing, the end used as a nozzle, served to dislodge scale and sawdust from the angles and corners. The usual water wash generally crowds the sawdust and tie-rod hole borings into the corners and leaves a deposit at these places, disgustingly evident at stripping time. An air jet correctly applied will blast this debris to a clean-out hole where it may be removed. Allowing a gauged amount of water to enter the air stream greatly increases the moving power of the compressed air. This method may also be used to advantage in removing laitance and to roughen slabs—if used just when the surface of the concrete is hardening.

Where construction joints occur at the level of floor slabs there is ordinarily no bearing surface for the inside wall form for the next lift above. This is not so important if the wall is to be furred or otherwise covered on the inside, but when left exposed as on this job the loose joint may result in leakage or an irregular offset. The outside form can be tightened against the hardened concrete of the previous lift and to provide a bearing for the inside form at these locations a few inches of wall above the slab were placed with the slab. This allowed both inside and outside forms for the next lift to overlap the hardened concrete and by means of the tie rod through the projecting stub wall the forms were made tight, as illustrated in an accompanying sketch. The wale on the inside was supported off the floor form with galvanized screed supports during placing of the slab. Wedging at studs and wales supplemented the tie rods to hold the forms tight at all construction joints.

Too much attention cannot be given to curing. Sprinkling the tops of walls twice daily is insufficient to prevent a plane of weak and slightly porous material which may spall if there is any working of the joint, and may show a difference in color. Covering construction joints with wet burlap or canvas is the right treatment to insure good curing.

Next of importance to construction joints in producing a good concrete surface is the elimination of air bubbles. These insistent little devils will no doubt be thoroughly licked in the near future, but on this job our best surfaces resulted when the mix was of the desired consistency and not too fat with fine aggregate, as previously stated. Overwet or over-dry batches, even with all due attention given to spading and vibrating of forms, leave excessive bubble-holes on the surfaces. A study of results obtained as related to type of form sheathing indicated that plywood surfaces with straight grain running vertically gave far less bubbles than undulating grain lines running horizontally. The assumption is that air bubbles are more thoroughly segregated as they work upward along vertical lines. On the other hand, when bubbles encounter horizontal lines they stop and combine with other bubbles, resulting in larger holes in the concrete surface. Because plywood has a greater tendency to cup when the grain of the outer ply is parallel to the studs, a somewhat closer spacing of studs is necessary if the grain is run vertically in order to avoid air bubbles.


CONSTRUCTION JOINT-LINE MARKING STRIPS
BEARING SHOULDER FOR WALL FORMS OF NEXT LIFT



Powerhouse unit at left and part of the outer cell block. All two stories high, the building sits low on a man-made island.

Beautiful surfaces resulted from vertical-grained forms used at the sides of the proscenium in the auditorium. Balanced and symmetrically-placed paneling also brought out some remarkable wall and ceiling surfaces. All surfaces show the fir plywood grain marks in true concrete character, free from any heavy wash or grout coating. Where bubbles persisted and were objectionable, the most successful treatment was to fill the holes with a grout made of portland cement, finely-screened sand and diatomaceous silica admixture. The grout was brushed over the entire surface, rubbed in with a stone, allowed to partially set, and the surplus was then rubbed off with burlap. The grout filled all holes, served as an abrasive in rubbing, and gave the desired color to the walls. Much of the concrete work came from the forms with such splendid sharpness of line and surface that but little filling and rubbing was necessary.

Large-membered detention-type steel windows were set into the forms and placed with the walls. The heavy anchors of these windows combining with the two curtains of wall reinforcement, and combining further with top, bottom, side and diagonal earthquake-stress bars specified at all openings, made a difficult barrier to the flow of concrete. Careful spading through poke-holes cut in window-sill forms encouraged the concrete to seek its proper place at these difficult places.

A small percentage of rock dust was added to the fine aggregate at the mixing point, increasing the fines in the sand. The admission of this type of aggregate, however, is not recommended by the writer until proper tests prove its worth. Good, hard granitic gravel aggregate along with plenty of cement, mixed in the proper water-cement ratio, gives the best tool-resisting qualities to the concrete.

The oiling of forms plays a great part in securing pleasing concrete surfaces. Oil applied with a brush was found to be more evenly placed than with a spray outfit. Newly-oiled panels should never be placed in a wall with panels treated quite some time previous, since this gives the concrete a decided change in color for each panel. This may occur when scarred and marked panels are rejected and replaced with newly-oiled panels. Although form oil penetrates and affects a very thin surface layer, only a specified and approved oil should be used. Ordinary grades of dark mineral oil cut with kerosene discolors surfaces, leaving them unsuited for painting with best results. Better surfaces result from forms oiled at least a week previous to use.

The R. E. McKee Company, through its superintendents, J. L. Morris, and C. W. Wright, and its able engineer, V. Z. Skinner, conscientiously pursued its work from start to finish, co-operating fully with the government engineers. Subcontractors Graham Brothers, Inc., did a splendid job of concrete mixing and delivery.

The project was planned jointly by the Department of Justice and the Treasury Department engineers and architects. Project construction was carried on by the Procurement Division, Public Buildings Branch, Treasury Department, of which Neil A. Melick is Supervising Engineer. F. R. Weeks was Construction Engineer in charge, with the writer assisting.

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